UNIFYING DEPARTMENT OF DEFENSE PROCUREMENT QUALITY ASSURANCE

by

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CHAPTER I

INTRODUCTION

Secretary of Defense Project 60 was inaugurated in 1962 to investigate and ascertain the possibility of unifying procurement contract administration and management under a common set of policy and procedural rules. Historically, these functions had been conducted separately within the several services and, more recently, in consolidated commodity procurement centers managed by one of the services. Each military department maintained redundant organizational elements consisting of regional representatives or residents at major contractor facilities. Considerable justification for a unification effort existed since the performance of procurement contract administration functions within the departments and the centers which they managed were governed by the requirements of the Armed Services Procurement Regulations (ASPR) and common Department of Defense (DOD) instructions. The ASPR requirements were imposed on all defense contractors through their inclusion in applicable articles and specifications in the procurement contracts and were administered by the separate field organizations in accordance with the DOD instructions.

Within the purview of Project 60 was the area of procurement quality assurance as it relates to contract management. A special

sub-group of the project force was formed to evaluate this area and to consider the feasibility of establishing reasonable uniformity in procurement quality assurance operations. That some consolidation was achievable in this area was supported by the uniform applicability of ASPR, Chapter XIV, Procurement Quality Assurance, and of the DOD 4355 series of instructions.

The level of operations for which uniformity was sought was not specified to the Project 60 sub-group for quality assurance. Their investigation, therefore, spanned systems, policies, procedures, and methodology then in use by the several departments.

There did exist a diversity of procurement quality assurance procedures and methods among the field contract management organizations. The quality assurance sub-group attributed the diversity to the separate administration of each department's contracts by their own functional elements and to the issuance of individual implementing instructions which supplemented DOD regulations and the ASPR quality assurance and inspection articles.[1] The implementing instructions, although founded on common sources and not constituting deviations from the ASPR provisions or from DOD instructions, did create variances in operating practices and multiple administrative requirements for both contractor and governmental quality assurance organizations.

The report reflected the effect of these implementation differences on the members of the sub-group. This was evidenced by the degree of

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[1]Secretary of Defense Project 60, Sub-Task Force No. 1, Quality Assurance Report, March, 1963.

formality and depth of control considered necessary in order to minimize the differences in uniform policy application. The report recommended one independent DOD agency charged with contract administration and containing a procurement quality assurance element. Periodic quality management audits of field activities by the proposed agency to ensure proper interpretation and implementation were also recommended.[1] For purposes of this study, the most significant recommendation was that which encouraged the preparation and promulgation of a Quality Assurance Manual which would be directive in nature, permit no variation by field activities without approval, contain specific procedural instructions for field effort in such areas as statistical evaluations, product verification inspections, quality element verifications, and establish minimum requirements for implementation.[2]

The recommendation for such a manual was accepted and a committee for its preparation established under the counsel and guidance of the Director of Quality Assurance and Reliability in the Office of the Assistant Secretary of Defense for Installations and Logistics. The committee consisted of the most competent personnel available within the military departments and the newly formed Defense Supply Agency (DSA). Indeed, these personnel were those responsible for their respective agency's quality assurance programs. They were also those whose implementing instructions had led to the divergent practices in the field organizations.

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[1] Ibid., pp. 6-7.

[2] Ibid., p. 253.

The manual was to become an appendix to the ASPR, Chapter XIV, Procurement Quality Assurance. This document is commonly referred to in the DOD as Appendix Q, a title which shall be adopted in this paper. The committee began its deliberations on April 1, 1964. In its charter, the committee was charged with the responsibility of producing a manual of procurement quality assurance policies and procedures which would be applicable, without detailed interpretation and implementation, to all types of commodities. The manual was to be useful to Defense Department quality verification effort regardless of military department or agency association.[1]

By January 1, 1967, Appendix Q had not been promulgated, although the general provisions of Chapter XIV had received a review and updating and had been issued for broad guidance. Other recommendations of Project 60 had proceeded on a timely basis. The proposed central DOD agency for contract administration had been tested, established, organized, and completely implemented by December 1, 1965, when the last Defense Contract Administration Services Region began operations in Los Angeles, California. The Defense Contract Administration Services (DCAS), as the new agency was entitled, did not achieve full independence but was assigned as an organizational unit of DSA. This event prevented its absorption of the complete responsibility for DOD quality assurance. Excluded from its

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[1] Interview with George Brown, Assistant Director of Quality Management, U.S. Naval Quality Assurance Office, Washington Navy Yard, Washington, D.C., February 9, 1967.

jurisdiction were the resident contract management organizations of the military departments.

With the authority of the new DCAS agency thus delimited, Appendix Q was made increasingly important to the consolidation of DOD quality assurance. The coordinating document has not been promulgated even though nearly four years have passed since Project 60 defined the need for the manual and nearly three years have elapsed since the implementing committee began its deliberation. Considering that such a delay is excessive, the underlying question which this paper is intended to illuminate is why the formulation of the procedural document has not yet been achieved.

The hypothesis of this paper is that the delay in publishing Appendix Q is attributable to differences in the basic approaches to procurement quality assurance which were found to be of unexpected depth and diversity among the military departments and the DSA. To test this hypothesis, the following study questions will be investigated:

1. What are the similarities and differences which exist in the philosophies, policies, and procedures of departmental procurement quality assurance?

2. What has been and is the effect of these similarities and differences in achieving the announced intention of publishing a uniform procurement quality assurance manual?

CHAPTER II

SCOPE AND INTENT

As mentioned in Chapter I, the discussion of the first question is limited to the concepts which developed within the Army, Navy, Air Force, and Defense Supply Agency (DSA). It is recognized, however, that there do exist several organizations having procurement quality assurance functions that are beyond the purview of the Department of Defense (DOD) even though the purchases of these organizations become part of the DOD equipment inventory. These agencies include the Atomic Energy Commission (AEC), the Defense Atomic Support Agency (DASA), and the National Aeronautics and Space Administration (NASA). Since their operations are not subject to DOD regulation, their procurement quality assurance functions are not discussed here.

The Navy Special Projects Office (SPO), responsible for all procurement functions attendant to the production and delivery of fleet ballistic missiles, is another entity that enjoys a degree of autonomy in contract administration. In its unique situation it does remain subject to DOD quality assurance policy direction and Navy implementation. While SPO procedures differ slightly from the basic Navy procedures, this office's requirement to establish a special contract administration field office at the prime

contractor's plant had its origin in Navy quality assurance philosophy. For these reasons, and the fact that the SPO was not excluded from accedence to the proposed manual, their activities are not discussed separately.

Differing from the AEC and the DASA, NASA considers an extensive field organization to be neither necessary nor desirable. Therefore, NASA has relied heavily on DOD agencies to perform much of its quality assurance activity. These operations, however, must be accomplished within requirements which are dictated by NASA and which reflect the unique stringency of their procurements.[1] These conditions must be accepted by the cognizant inspection unit. Where the additional assurance cannot be gained by the DOD organizations to the satisfaction of NASA officials, a separate field office is established by NASA.

Pursuing the first question of this study, it seems reasonable to expect that the underlying causes for different applications of common policy directives are founded on historical patterns of procurement quality assurance. The trend of this historical development and the significant events pertinent to the discussion are traced in the next succeeding chapters for each of the Army, Navy, Air Force, and DSA procurement quality assurance programs. In so doing, the major quality elements comprising effort in each of the departments are identified. After collecting and identifying the elements of interest in Chapter VII, a comparison is made in

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[1]NPC 200-1A, Quality Assurance Provisions for Inspection Agencies, prepared by NASA Reliability and Quality Assurance Office (Washington: U.S. Government Printing Office, June, 1964).

Chapter VIII. At this point, the answers to the first study question are discernible.

Accordingly, attention is directed to the second study question concerning the effect of the variety of approaches on the achievement of a standard quality assurance manual. Secretary of Defense Project 60 is discussed in Chapter IX with emphasis on the recommendations for unifying procurement quality assurance and developing a manual.

As the investigation of the effort to produce a standard manual proceeds in Chapter X, less documented evidence is available. The reason for this is due to the fact that minutes of the conferences on Appendix Q were not maintained. The discussion, therefore, is validated by the oral expressions of those personnel who direct, monitor, or are closely associated with the production of Appendix Q, including several of the committee members.

The conclusions and recommendations in Chapter XI represent only the opinions of the author. They are not attributable to any one individual in the past or current employ of the Department of Defense, and should not be associated thus, nor out of context.

CHAPTER III

HISTORICAL DEVELOPMENT OF U.S. ARMY QUALITY ASSURANCE

Advances in the concepts and practices of procurement quality assurance were made only after the mathematicians and scientists of the Bell Laboratories, in the mid-1920's, developed statistical methods and theory.[1] In 1931, W. A. Shewhart called attention to the validity of statistical concepts in the control of manufacturing processes.[2] It was not until World War II that practical application of these concepts were attempted by the military services. Previously, procurement quality assurance consisted of 100 per cent inspection or an inspection based on a percentage of total product. Early in the war the military departments realized that this philosophy was incapable of inspecting and accepting increasing quantities of material produced by numerous suppliers inexperienced in military contracting.[3]

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[1] John J. Riordan, "Protecting the Consumer Against Inferior Quality," Department of Defense Cost Reduction Journal, II, Issue 3 (Fall, 1966), p. 39.

[2] Walter A. Shewhart, Economic Control of Quality of Manufactured Product (New York: Van Nostrand, 1931).

[3] Riordan, op. cit., p. 39.

It was during this period that the Ordnance Department employed a number of specialists, including some of those from the Bell Laboratories, to pursue the development of statistical techniques. The effort was successful and produced a variety of statistical sampling plans which could be used on the specific types of commodities procured by that department.[1] These commodities were relatively simple in design and physically measurable. They readily adapted to the new techniques provided that one critical requirement was met: the inspection characteristics to which the plans applied must be homogenous. This was ensured by issuing Standard Inspection Procedures which collected inspection characteristics into homogenous groups. The remainder of the Army, however, continued to drive every tank, truck and jeep, fly every aircraft, and expand its inspection forces in proportion to the increase in product acceptance workload.[2]

The decrease in inspection personnel which followed World War II did not anticipate the advent of cold war nor the continued high level of military purchasing.[3] By 1953, therefore, statistical sampling had been expanded to verify nearly all items produced for the Army. At the same time, contractors were being exhorted to provide their own control of product quality.[4]

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[1] Ibid., p. 40.

[2] Interview with S. L. Lorber, Director, Quality Assurance Directorate, Army Material Command, January 24, 1967.

[3] Ibid.

[4] Secretary of Defense Project 60, op. cit.

In the period 1953 through 1959, the need to place legal responsibility upon the contractors was manifested in a variety of purchase descriptions which included the requirement to initiate adequate systems for the control of quality. These were followed by contractual requirements in the form of a general specification.[1] This effort culminated in April, 1959, with the issuance of a coordinated quality control system requirement for inclusion in military contracts.[2]

Historically, the Army, its sister services, and industry had accepted the inference that responsibility for product quality was vested in the acceptance authority of the military field inspection organizations. With the application of the new requirement to more complex products, such as missiles and highly sensitive electronic communication and detection devices, it became apparent that statiscal procurement quality assurance concepts were inadequate to evaluate the adequacy with which industry carried out its quality control responsibilities.[3]

In defining what constituted adequacy, the criteria chosen were based on a contractor controlling his product quality well enough to allow a reduction in the magnitude of Army inspection required for product

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[1]Specification MIL-G-14461, General Quality Control Requirements for Ordnance Material (January, 1957).

[2]Specification MIL-Q-9858, Quality Control Systems Requirements (April, 1959).

[3]Interview with S. J. Solt, Director, Quality Management Branch Department of the Navy Quality Assurance Office, November 8, 1966.

acceptance.[1] In the Ordnance Corps, this guidance was developed, in the traditional statistical manner, into a mathematical procedure. It was used to determine the validity of a contractor's report of inspection characteristic acceptance.[2] The Ballistic Missile Agency found statistical approaches inappropriate to reduction in procurement quality assurance of Redstone and Jupiter missiles. This resulted in a study, undertaken by the Ordnance Corps in 1957, to develop an approach to the verification of contractor quality assurance performance on high dollar value, low volume, highly complex products. The study was later expanded to encompass all policy and procedure in the Corps, including the statistical concepts that governed acceptance of high volume, low dollar value, non-complex products. The philosophy of using contractor-generated objective quality evidence to evaluate performance was developed. After the reorganization of 1962, the Ordnance Corps documents which reflected this concept were promulgated as the Army Quality Assurance Program.[3]

Underlying the Army Quality Assurance Program is the Ordnance Corps tradition of physical handling of the product during performance of Standard Inspection Procedures for acceptance. The policies and procedures

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[1] Army Regulation 715-20, Procurement Inspection and Quality Control (April 15, 1955).

[2] DOD Handbook H-109, Statistical Procedures for Determining Validity of Supplier's Attributes Inspection (Office of the Assistant Secretary of Defense, Supplies and Logistics), May 6, 1960.

[3] AMCR 715-508 and 715-509, Inspection Administrative Manual and Quality Assurance Technical Procedures.

indicate that more emphasis on this function is expected of field quality assurance representatives than on any other function. The attitude is best expressed, perhaps, by the following quotation:

> Quality is measurable only at the final user's level when he unpackages a product and prepares it for use. The inspector may be the last man to see that material who is capable of adjudging its ability to perform its intended use.[1]

This concept pervades the implementation of the Army procurement quality assurance program. It has contributed to another deeply entrenched philosophy which dictates that each inspector shall be independently capable of performing every inspection and test required to verify the product function.[2] This idea prevails even when the complexities of the equipment which tests the functional performance of the product requires more highly skilled and specially trained contractor technicians. While there are instances where the Army inspector is allowed to witness an intricate test procedure conducted by contractor personnel, the inspector is warned that such witnessing is least likely to assure the product.[3] The increase in necessary witnessing operations has led to the establishment of test equipment verification laboratories within affected Army technical commands to aid the field inspector in evaluating the quality of the product by verifying the test equipment used to accept it.

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[1] Interview with Lorber, op. cit. [2] Ibid.

[3] AMCR 715-509, Quality Assurance Technical Procedures.

Contractual techniques have been developed which also aid in verifying the adequacy of a contractor's sytem for controlling quality. It is a prime requisite that the first production models be independently tested and dissected at arsenals, proving grounds, or separately contracted private laboratories before production for delivery is authorized. Exceptions have occurred because of political, budgetary, or time restraints, but the validation is not pre-empted. It is conducted concurrent with the first of similar periodic tests which are made on samples as they are produced throughout the life of the contract. Important to this concept is that this verification is done without reference to contractor inspection procedures or to the Standard Inspection Procedures. The evaluation is made devoid of prior considerations and governed only by the requirements of the contract.[1]

The emphasis on verification of the actual end product does not preclude the attempt to predetermine and monitor the adequacy of a contractor's quality system. This is accomplished by several means, the first of which is the performance of a survey which investigates the quality system existent and planned for a commodity prior to the issue of a contractual award. The pre-award survey includes past performances on military procurements but relies more heavily on the studied familiarity of the investigators with the item to be produced. A successful survey hinges on the purported ability to accurately and adequately apply quality techniques and

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[1] This and most of the remainder of this chapter is attributable to Lorber, op. cit.

procedures to the design and production peculiarities of the particular product. The assigned field activity carries on the continual redetermination of the producer's quality system through the monitoring of actual practices and of all the documentation which supports the assurance of quality in the end product.

The deemphasis of contractor quality systems observation arises from the philosophy that it is least likely to assure the product. Coupled with proximity to the product, this reason is responsible for field inspector determination of what characteristics need to be inspected. The Standard Inspection Procedures and Quality Assurance Plans are subject to approval by the next higher echelon of inspection, usually the quality assurance section of a technical office.

Complex supplies containing quality characteristics which became unverifiable beyond a certain stage of assembly induced a requirement for in-process inspection. The introduction of customer validation of subcomponents adapted existing statistical sampling methods to a product acceptance structure which tolerates considerable variability. This approach is valid until parametric tolerances require verification at earlier levels of the production process, but this contingency generally is not characteristic of Army procurements.

In-process inspection was the procedure adopted for control of certain supplies which were subcontracted. The extent to which product verification is conducted at the place of manufacture depends on the degree

to which important quality characteristics became unverifiable upon receipt at the final production facility. Source inspection operations of this kind were delegated to regional representatives of the same commodity command until the 1962 reorganization. Presently, combined regional procurement districts perform this function with advice from cognizant technical commands or as determined from the Standard Inspection Procedures.

A certain amount of discrepant material may occur in any production process. Inasmuch as some of these non-conformant items are usable or repairable, it is in the interest of the procuring agency to consider acceptance of such material in order to limit the ultimate procurement costs. If the contractor is the design agent and technical representation by the procuring agency is readily available, Army policy allows the establishment of a non-conforming material review board. If not established by the Standard Inspection Procedures, these boards determine the criticality of the defective characteristics and have authority to disposition the items. It is rare to accept defects which have major effects on the product's function but common to accept those of a minor nature. This depends upon the type of contract, product mission, nature of the production processes and techniques, and the ability of the representative.

In all cases where characteristics have major effects on the products, the Army's formal waiver procedure prevails. This procedure requires the concurrence of the field quality assurance agent, the technical agency, and the contracting officer. The process ensures that incremental

changes do not have interfacial detriment and that cost adjustments are realized.

The role of the "Key Inspection" organization is pertinent to the overall quality program. These units developed within the commodity commands as a coordinative element among the regional and resident representatives and presently function in a similar capacity for the technical commands. Very much product-oriented, the key inspectors had authority to review any and all aspects of the Army effort only. As the emphasis for quality assurance responsibility shifted to contractors, the key inspection role expanded and is now able to approach the producers as independent audit agencies. The authority to review does not imply the authority to direct. Nonetheless, key inspection recommendations encourage reevaluation and adjustment of procedures at all levels.

CHAPTER IV

HISTORICAL DEVELOPMENT OF U.S. NAVY QUALITY ASSURANCE

The Navy recognized in World War I that its technical bureaus had practiced material and personnel competition which was motivated by the urgency of military procurement. Additionally, the department recognized that inefficiency occurred when two or more bureaus conducted concurrent procurement quality assurance operations in the same facility, inspecting the same material to substantially the same characteristics using the same general plan of 100 per cent inspection. Accordingly, in 1927, the Navy combined the separate inspection forces maintained by the Bureaus of Aeronautics, Ordnance, Engineering, Hull and Yards and Docks into the Material Inspection Service, U.S. Navy. Underlying this reorganization was the fundamental belief that a qualified inspector can satisfactorily inspect and accept material in compliance with contract and technical requirements regardless of the identification of procurement agency or ultimate user.[1]

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[1] Ralph M. Lockhart, "Material Inspection and Quality Control Within the Department of Defense" (unpublished Master's thesis, ICAF, Washington, D.C., 1956), pp. 3 and 17.

The organization of the Material Inspection Service does allow for special, highly technical items of production to be administered by the responsible technical bureau or agency when resident surveillance is considered necessary. Product assurance is not a controlling factor in determining the need for residence, however. That decision is based on technical design and coordination control, high dollar value, or security requirements. For this reason, even sub-bureau level resident representation is tolerated. Examples are the Bureau of Naval Weapons Special Project Office procurements of fleet ballistic missiles and the Bureau of Ships nuclear propulsion program. An attempt to coordinate overall procurement quality assurance policy for both specialized and generalized administration was made by creating an inspection section with broad directive authority in the Office of Naval Material.[1]

Quality assurance consisting of 100 per cent inspection or straight percentage sampling remained the basis for material acceptance until 1943 when, collaborating with the Army Ordnance Department efforts, the Navy's Bureau of Ordnance embarked on a program to develop and apply statistical sampling plans. The Navy's effort was directed more toward the application of statistical quality control techniques to manufacturing operations in its own Naval Ordnance Plants than to improvement in procurement quality assurance practices.[2] As a result, there was more concern with the

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[1] Ibid., p. 17.

[2] J. J. Riordan, "Protecting the Consumer Against Inferior Quality," op. cit., p. 40.

validity of sampling techniques than was apparent in the Army endeavor. The Navy focused on those product characteristics that needed greatest control. From this attention to comparative need evolved the procedure of classifying potential defects by categories of effect upon material safety, function, life, and interchangeability.[1] The classification of defects made it possible to relate inspection intensity to the significance of the characteristic being verified.[2]

Before the end of World War II, Standard Sampling Inspection Procedures were used by the Navy wherever products were submitted in lots and consisted of characteristics which could be classified as defective or non-defective.[3] Such characteristics were defined as attributes of inspection. These sampling procedures were assembled into attribute inspection tables in 1946 and became a contract requirement for manufacturers and Navy inspectors in determining the acceptability of material.[4] By 1950, modified tables of the same basic design were required by all military departments.[5]

Influenced primarily by the work of E. L. Grant, the Navy Department continued its pursuit of a general statistical quality control program

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[1]Office of Naval Material Instruction 5000.3, Material Inspection Service, U.S. Navy Administration Manual, II, Ch. 7.

[2]Riordan, op. cit.

[3]Secretary of Defense Project 60, op. cit.

[4]Navy General Specifications for Inspection of Material, Appendix X (Washington: U. S. Government Printing Office, April 1, 1946).

[5]Specification MIL-STD-105A, Sampling Procedures and Tables for Inspection by Attributes (September 11, 1950).

during the early 1950's.[1] The objective was the development of a coordinated inspection procedure from machine and process levels through final acceptance based on statistical principles which would maximize the assurance that a minimum of unacceptable material was produced. The effort was supported by the fundamental belief that product inspection was more vital to material quality than observation of contractor quality systems and procedures.[2]

The statistical emphasis of the Navy's procurement quality assurance program remains strong today but it has lost its dominant role. In the middle and late 1950's, two major factors contributed to this shift in approach. One of these was the increasing conviction that the contractor must be made responsible for his own product quality. The other was the attempt by the Navy to maintain purity in statistical sampling for acceptance and for machine and process control. However, valid statistical methods required more manpower than was available. Their application shifted, therefore, to use in determining the adequacy of a contractor's quality control system. In substance, valid statistical inspection planning was required of producers and implemented systems were evaluated accordingly. This approach had the effect of paying the contractor to do what the Navy inspection organization would have done had it had the manpower and, at the

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[1]Eugene L. Grant, Statistical Quality Control (New York: McGraw-Hill, 1946).

[2]Interview with S. G. Hamner, Head, Quality Assurance Branch, Office of Naval Material, January 26, 1967.

same time, began to shift the emphasis for product quality responsibility.[1]

The task of the Navy inspector now appeared to be redundant. The verification process, therefore, was redesigned. The new definition retained its product orientation but included contractor records of statistical inspection results which were reviewed by the inspector and appraised in relation to his own product verification results. Thus, the adequacy of the contractor's system was inferred from product inspection. The mathematical mechanics of the comparison included only one level of inspection reduction.[2]

The statistical approach to quality assurance remained limited to products whose acceptability was definable in terms of defective or non-defective attributes.[3] After further study, the classification of defects concept was combined with the requirement to perform customer inspection during production at component and sub-assembly levels. With some compromise in its purity, the statistical method was applied to complex products such as missiles, radars, and computers. The method did not suffice for inferring the quality of assembly in ships and aircraft, however.[4]

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[1] Interview with Dr. W. A. Pabst, Chief Statistician, Naval Air Systems Command, Washington, D.C., October 17, 1966.

[2] Office of Naval Material Instruction 4355.35, DOD Procurement Inspection Policies and Procedures for Items Covered by Military and Federal Specifications (November 18, 1957).

[3] NAVORD OSTD 78, Ordnance Standard for Ordnance Classification of Defects (1951).

[4] Office of Naval Material Instruction 4355.40, DOD Policies and Procedures for Assuring the Production of Complex Supplies and Equipment (April 3, 1959).

The Bureaus of Ships and Aeronautics accepted its products on the basis of their ability to adequately specify functional performance requirements in the contract and to devise suitable trials and tests which would demonstrate the successful accomplishment of those functions. The procurement of ship construction material, the fabrication of its hull and the fitting of its equipment was verified in terms of military specifications for material and approved blueprints. Rejection authority rested on the documentation referenced in the contract. For this reason, much effort has been expended by the Bureau of Ships in establishing standards for processes related to ship construction such as welding, riveting, pipe fitting, and electrical soldering. These standards were inserted into contracts as an aid to assuring the quality of the final product. In addition to this procedure, warranty is a major element in the control and evaluation of a contractor's quality assurance system.[1]

The test pilot is the ultimate procurement quality assurance representative for aircraft. His recommendations concerning acceptance trials and tests are final and authoritative. With the increasing complexity of these systems and the accompanying delicacy and density of aircraft accouterments, inspection on the production line was instituted. This effort is called quality assurance but is primarily a matter of ensuring that critical steps in the assembly process are not overlooked, particularly if the step becomes

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[1]Interview with Hamner, op. cit.

unverifiable at higher assembly levels. For this reason, inspectors of naval aircraft take maximum advantage of contractor-generated records and detailed assembly prints in performing their function. Inspection of this type has not required the sophistication characteristic of large volume, statistical, acceptance procedures but such techniques are applied to subassembly material and equipments.[1]

After adoption of the DOD requirement for contractor quality control and inspection systems in 1959, the Navy retained its contractor record and product verification approach to evaluation. Observation of contractor policies and procedures was not endorsed to the field level until promulgation of a DOD evaluation handbook which provided a check-off list of supplier quality control elements.[2] These elements were modified to emphasize the employment of objective quality evidence. The resulting check-off lists, entitled FORM NAVEXOs 4355/7, were used in the monitoring efforts of all units of the Material Inspection Service.[3] The frequency of monitoring actions was defined only by the Bureau of Naval Weapons, which, at the time, included aircraft procurements. They were to be conducted upon

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[1]Interview with F. R. Sheehan, Assistant Head, Quality Assurance Branch, Office of Naval Material, Washington, D.C., January 26, 1967.

[2]DOD Handbook H-110, Evaluation of Contractor Quality Control Systems (October 31, 1960). This manual is obsolete and has been replaced by DOD Handbook H50. The latter no longer contains check-off lists but FORM NAVEXOs 4355/7 are still effective.

[3]Office of Naval Material Instruction 5000.3, Material Inspection Service, U.S. Navy, II, Chapt. 7, pp. 7-19.

commencement of a new procurement, upon major change in the contractor's system, and at such other times as deemed necessary by the Navy's quality assurance representative.[1] This definition applied only to specialized offices of the Material Inspection Services under the cognizance of that Bureau. The Bureau of Ships developed special teams for shipyard evaluations and utilized a set of special quality elements that characterized naval construction.[2]

It is important to note at this point that, historically, the Navy has steadfastly refused to approve contractor systems for quality assurance regardless of evaluation results.[3] Since the contractual vehicles advise a producer that his plan is subject to disapproval and does not discuss approval, the Navy has maintained this position and is not expected to change.[4]

Broad guidance is for individual determinations of the need for inspection at vendor and subcontractor plants.[5] Decisions are made by contracting officers on the basis of availability of objective quality evidence

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[1]Bureau of Naval Weapons Instruction 4330.12, Bureau of Naval Weapons Representatives Field Administration Manual (1962), para. 107131.

[2]Bureau of Ships Instruction 4355.23, Quality Assurance Evaluation Teams, (December 3, 1962).

[3]Office of Naval Material Instruction 5000.3, op. cit., pp. 7-14.

[4]Interview with H. P. Sullivan, Head, Quality Assurance Section, Naval Ordnance Systems Command (formerly Bureau of Naval Weapons), November 18, 1966.

[5]Office of Naval Material Instruction 5000.3, op. cit., pp. 7-6/7.

and of special inspection equipment which will enable the prime contractor and the Navy inspectors to verify reported results. The guidance has been loosely interpreted because of the geographic convenience of Material Inspection Service offices. Later, more critical review of the requirements was undertaken in order to minimize overall procurement quality assurance costs. The result was an increase in prices bid for contracts which anticipated great reductions in government source inspections.[1]

Control of nonconforming material took several forms. The original concept granted blanket authority for acceptance of minor defects to individual inspectors unless specifically withheld by the contracting agency. The Bureau of Ships did withhold this authority at the inspector level but retained it in the person of the Supervisor of Shipbuilding in residence at the shipyards.[2] Nonconforming material control was strengthened by the classification of defects system which removed the burden of determining the criticality of defectiveness observed. Using this system, the generalized offices had no difficulty in dispositioning non-conforming material. Consolidation of the Bureau of Ordnance and Aeronautics resulted in a policy which delegated to plant representatives the authority to accept defects which did not affect safety, compatibility, performance, weight, service life,

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[1]Interview with Sullivan, February 6, 1966.

[2]Secretary of Defense Project 60, op. cit., p. 136.

[illegible] will enable the [illegible] [illegible]. The [illegible] [illegible] [illegible]. The [illegible] [illegible].[1]

[illegible] several forms. The [illegible]. The [illegible].[2] [illegible].

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[1] [illegible]

[2] [illegible]

interchangeability, and reliability and did not require a change in the contractual scope of work.[1] This was necessiated by the lack of classification of defects in the aircraft industry, but it opened the door for local acceptance of material which could have greater than minor effects in areas not specified. The implication has been recognized but has not been rescinded.[2]

Significant in the Navy control of non-conforming material is the establishment of waiver policy by each technical agency. Waivers require procurement agency concurrence and pertain only to levels of non-conformance not authorized for disposition by local quality assurance representatives. They are carefully avoided by manufacturers since there are no requirements to advise procurement or technical agencies of dispositions made within the purview of the field activity. Exceptions do exist, however, in the procurements of fleet ballistic missiles and nuclear propulsion equipment.

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[1] Bureau of Naval Weapons Instruction 4355.12, Sec. 10, Air Force and Bureau of Naval Aeronautics Policy for Material Review (February, 1960), redesignated from Bu. Aer. Inst. 4355.11, Sup. 1, October, 1955.

[2] Interview with Sullivan, November 18, 1966.

CHAPTER V

HISTORICAL DEVELOPMENT OF U.S. AIR FORCE QUALITY ASSURANCE

In the years preceding World War II, military aircraft procurement was considerably different from today's predetermination of requirements and subsequent invitations to industry for production bids. Then, a manufacturer produced an aircraft and invited the Army Air Corps to consider it for military adaptation. If the proposed vehicle was determined feasible for use, only then did the contractor and Air Corps personnel discuss the terms of procurement and the administration of the contract.[1] Because of the relatively small amount of such procurement, the consequent small number of field personnel and the existence of production models, the Air Corps had practically no organized inspection program and no formal procedures for test and acceptance of material. It was left to the senior inspection representative to determine the amount and type of quality assurance needed in a particular situation. Their determinations were hardware oriented with little or no reliance being placed on contractor efforts, even though inspection organizations did exist in aircraft manufacturing plants.[2]

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[1]Interview with R. P. Hussey, Director, Procurement Policy, Air Force Systems Command, Washington, D.C., January 25, 1967.

[2]Secretary of Defense Project 60, op. cit., p. 212.

The rapid expansion of aircraft production during World War II and the problems of mass-producing hitherto handcrafted machines caused industry to recognize the need for formal organization of its own inspection programs. The Air Corps chose to rely on the contractor inspection effort because of limited personnel and, instead of duplicating their effort, developed a type of work sampling called spot checking.[1]

Performing under contract from the Army Air Corps, a University of Stanford study recommended that military procurement policy should require a contractor to be contractually responsible for product quality.[2] The recommendation resulted in a specification which was incorporated into most material procurement contracts. It defined basic management and technical parameters for the control of quality by contractors without distinguishing between complex and non-complex materials.[3]

Paralleling this emphasis on producer quality responsibility, the Air Corps developed its spot-check technique into what is described variously as system inspection, procedure verification, or surveillance. Procurement Quality Control Manual 74-1 distinguished between field operations of a direct and indirect nature. Direct inspections emphasized spot

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[1] Ibid., p. 213.

[2] Stanford Research Institute, The Inspection Function of the United States Air Force (1949).

[3] Specification MIL-Q-5923, Quality Control System Requirements (1950). Now obsolete; replaced by MIL-Q-9858 in 1959.

checking of hardware. Indirect methods addressed raw materials, processes, tools, cleanliness, test equipments, calibration, documentation, and the contractor's procedures for the control of these contributors to the quality of end products. Underlying this type of inspection effort was the premise that if these controls were adequate, the quality of the product would be satisfactory and the product would be acceptable.[1]

The Air Corps recognized the value of the statistical methods for sampling and process control and encouraged its use by contractors. These methods were extensively employed by manufacturers but they were not used to significant extent by the customer representatives.[2]

The Department of the Air Force evolved from a technical commodity command of the Army which maintained a separate quality assurance organization. As a result of not dividing itself into Corps or Bureaus, the entire inspection organization was transferred into one branch of the Air Material Command, now called the Air Force Systems Command. In so doing, the coordination for procurement quality assurance remained centralized and policies and procedures developed before were not lost in the transition.[3]

Between 1949 and 1959, the Air Force directed its attention to refining consumer-supplier relations in an environment where the contractual

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[1]Interview with R. P. Hussey, January 25, 1967.

[2]Secretary of Defense Project 60, op. cit., p. 214.

[3]Ibid.

burden of final product quality responsibility was upon the contractor.[1] During this period, the Air Force developed the procedure of taking fifty quality element observations within a seven-day period at each inspection station within a contractor's plant. Inspection stations were determined by the field representative. Observations were defined broadly to include both direct and indirect inspection of the procurement quality assurance elements. These elements were also established by the local representative within the guidelines of contract specifications and the quality assurance manual.[2] This procedure constituted the Air Force continuous audit program. It also defined a minimum quality assurance effort independent of the volume of product being produced. This was a departure from Army and Navy minimal effort which was a function of product quantity.[3]

Whereas the Air Force specification of quality control requirements for contractors had not distinguished between complex and non-complex material, the superseding DOD specification limited itself to complex procurements. This left a gap in Air Force non-complex procurements of petroleum products, textiles, etc., and implied the increased use of indirect techniques in evaluating contractor quality control systems employed in

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[1] Riordan, "Protecting the Consumer Against Inferior Quality," op. cit., p. 40.

[2] Air Force Systems Command Manual 74-1, Procurement Quality Control Manual, Chapters III and V, August 22, 1962.

[3] Secretary of Defense Project 60, op. cit., p. 138.

the production of its complex aircraft weapons systems. Inasmuch as the ratio of direct to indirect inspections was not specified and personnel levels were not commensurate with the growth in material purchasing levels, indirect methods became paramount in field agency operations. Direct product verification was reduced drastically except in ballistic missile production where field representation as compared to product volume was maintained at a relatively high ratio.[1]

The absence of contractual vehicles for application on procurements of non-complex items resulted in Air Force support for the Army's development of a suitable DOD specification. The resultant document was a derivative of the previous specification and defined the contract requirement as one of physical product verification and general inspection rather than an integrated quality assurance system.[2] The introduction of this document enabled continuance of established Air Force surveillance methods, but did imply an increase in the use of direct inspection procedures.[3]

The nature of Air Force procurements anticipates ultimate technological obsolescence and minimizes the probability of reprocuring identical equipment. This influence tends to direct high-dollar-value contracts to those manufacturers having better than average reputations for reliable

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[1]Interview with Hussey, op. cit.

[2]Specification MIL-I-45208, Military Inspection Requirements (December 29, 1960).

[3]Interview with Hussey, op. cit.

contract performance. This feature has supported the concept of purchasing complex product design as well as the material. In effect, the contractor's quality control system is also purchased after an initial pre-award survey establishes the general acceptability of organization, policies, and procedures designed to perform the quality function. This practice accredits the policy of performing only sufficient surveillance to ensure that the contractor does what he agreed to do in the contract.[1] On this point, the Ballistic Missile Division has inserted a contract provision, Exhibit 80, which substituted contractor verification and quarterly reports for resident Air Force quality assurance representation. The cost comparisons, however, were inconclusive and the pursuit of this idea was abandoned.[2]

The philosophy of purchasing quality assurance from reliable contractors pervades Air Force spare parts procurements and efforts to control subcontracted supplies. The prime contractor is ultimately responsible for that control and his performance in this area is evaluated by occasional visits to vendor plants and source acceptance of material destined for military owned and operated assembly and repair units.[3]

Notwithstanding the efforts of a reliable contractor and the quality assurance representative, nonconforming material is created. Disposition

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[1]Interview with S. J. Solt, member, Defense Contract Management Review Committee, Washington, D.C., October 21, 1966.

[2]Interview with Sheehan, op. cit. Confirmed in telephone conversation with R. P. Hussey, February 2, 1967.

[3]Air Force Systems Command Manual 74-1, op. cit., Chapter XV, August 22, 1962.

of such items is delegated to the field organizations within the restrictions of the contract and the requirement that the defects do not affect safety, performance, interchangeability, and contractually specified reliability. Since the Air Force has not established comprehensive classifications of defects, there does not exist a predetermined guide to criticality of defective items. This is an engineering judgment made most often by contractor personnel inasmuch as the contractor normally retains design authority. Procedures for waiver of requirements and acceptance of those discrepant materials withheld from field disposition is subject to the direction of the procuring agency. The field agency remains responsible for reviewing the volume and type of nonconformant items. It is not required, however, to report the promptness nor adequacy of action taken to prevent recurrence of the discrepancies.[1] This condition exists even though the object of controlling nonconforming material is to correct the cause of its production.[2]

In point of clarity, it should be noted that a concept did develop for classifying product characteristics. Their design and use differed from classification of defects in that these characteristics were to benefit contractor engineering personnel in determining realistic reliability and maintainability objectives.[3]

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[1] Ibid., Chapter XIV, originally established in U.S. Air Force Specification Bulletin NR 515, Control of Non-conforming Supplies, Nov. 3, 1959.

[2] Interview with Hussey, January 25, 1967.

[3] Air Force Systems Command Regulation 74-5, Quality Control Program for Ballistic Missiles and Space Systems (March 27, 1961).

CHAPTER VI

HISTORICAL DEVELOPMENT OF DEFENSE SUPPLY AGENCY QUALITY ASSURANCE

The Defense Supply Agency (DSA) has existed as an organizational entity only since November, 1961.[1] It has developed, however, certain characteristics of its quality assurance function which are pertinent to the questions addressed by this paper.

A DOD-wide organization which would provide guidance and criteria for procurement quality assurance operations throughout the several military services was supported by the Second Hoover Commission. It recommended consolidation of this effort and coordination of contractor and customer product validation requirements.[2] These recommendations were considered necessary in spite of existing DOD directives which predated the commission's report.[3] Implementation of directives had been slow. Some agreement had been achieved regarding interchange of inspection

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[1] DOD Directive 5105.22, Defense Supply Agency (November 6, 1961).

[2] Commission on Organization of the Executive Branch of the Government, Task Force Report on Military Procurement, Sec. C, Contract Administration, June, 1955.

[3] DOD Directive 4155.6, DOD Quality Assurance Concept and Policy (April 14, 1954) and DOD Directive 4155.3, DOD Procurement Inspection Policies (September 10, 1953).

services in plants having resident representatives.[1] Coordinated effort also produced the contractual requirements for contractor product quality responsibility.[2]

After the appointment of Robert S. McNamara as Secretary of Defense, a series of DOD Directives were published which established a single service procurement manager for some of the material common to all the military departments.[3] The service managers continued to employ procurement quality assurance policies and procedures characteristic of their respective military departments. The establishment of DSA rapidly followed. Each service manager became a commodity supply center for the new organization in addition to five newly formed Defense Supply Centers. The existing field activities which had performed inspection functions for the single managers in areas of clothing and textiles, subsistence and general supply were consolidated to form eight new Defense Supply Agency Procurement Support Offices. Two regional sub-offices were formed solely for the administration of constructional lumber procurements. The remaining Defense Supply Centers negotiated new inspection interchange agreements

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[1] Army Regulation 410-6-58, Inspection Interchange Agreements (Nov., 1958); Air Materiel Command Regulation 74-14, Interchange of Inspection Services (June, 1960); and Office of Naval Material Instruction 4355.6, Interchange of Inspection Services among Procurement Inspection Activities, (August, 1960).

[2] Specification MIL-Q-9858, op. cit.; and Specification MIL-I-45208, op. cit.

[3] DOD Directives 5160.16, 5160.11, 5160.36, and 5160.31, Single Manager Assignments for Medical, Subsistence, Construction and Industrial Supplies, (April, 1961; October, 1961; August, 1961; and August, 1961).

with existing military organizations. Effectively, therefore, the new DSA relied on a continuation of procurement quality assurance philosophies and policies effective at the time of reorganization.[1]

The agency was assigned responsibility for the quality of procurements under its cognizance, for the action appropriate to that assurance, and for the conduct of product acceptance in accordance with contractual quality specifications.[2] To carry out these responsibilities on a consolidated basis, the formulation of a DSA procurement quality assurance manual was undertaken. Prior to its promulgation, however, the recommendations of Secretary of Defense Project 60 were implemented and the Defense Contract Administration Service (DCAS) was assigned as an organizational unit of the DSA.

The new DCAS organization combined regional contract administration agencies of the military services excepting certain resident representatives situated at key industrial facilities. It also exempted a few specific types of contracts such as those of the Army Corps of Engineers and the Navy Civil Engineering Corps which purchased military construction. With these few exceptions, the agency assumed the procurement quality assurance functions for all Defense Supply Centers and their field activities.[3]

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[1]Secretary of Defense Project 60, op. cit., pp. 65, 66, and 163.

[2]DOD Directive 5105.22, Defense Supply Agency (November 6, 1961).

[3]Department of Defense, An Introduction to the DSA (Washington: Government Printing Office, 1966), pp. 4 and 36.

This greatly expanded responsibility for product quality contributed to the delay and extensive review of the anticipated manual. Some new policies were introduced into this review. One was that the customer should refrain from actions of any kind that might affect the contractual relationship between the prime contractor and his vendors. This policy was designed to prevent the implication that Defense inspection of subcontracted supplies constituted prior acceptance of a portion of the end product. Such inspection was interpreted as relieving the prime contractor from requirements to control the quality of that portion of his purchased components. Another concept of the review was that the procurement agency, although empowered by the Armed Services Procurement Regulations to direct what shall be verified, had no authority concerning the means of verification. How this function was performed was the responsibility of the DSA. A third element of consideration was that DSA field representatives should not interpret instructions received from the procurement agency without approval of contracting officers. This was necessary in order to ensure adequate control over widely dispersed resident and itinerant representatives and to prevent inadvertent and unauthorized effects on contractual scope of work.[1]

The resultant document did reflect the influence of these philosophies. Purchased supplies are reiterated to be the responsibility of the prime contractor. Provision is made for verification of contractor controls

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[1]Interview with Donald T. Vining, Head, Quality Plans and Policy, DSA, Washington, D.C., February 9, 1967.

over his vendors. These evaluations do not include physical product inspection or acceptance procedures except in those cases where the product is shipped directly to a DOD using activity or where the procuring agency requires product verification.[1]

Control of a field representative's ability to affect contractual relationships rests on the integrity of the individual and on the abundant exhibition of the dangers involved which are expressed throughout the manual. In addition, the representative is not authorized to disposition nonconforming material of any classification except as specifically directed. A purchasing office may delegate authority to accept minor discrepancies to the responsible Contract Administration Office and, in this manner, make disposition authority more accessible to the field inspector. In unusual circumstances where technical advice from the purchasing agency is readily available, a board for the review of nonconforming material may be established. In such cases, the on-site quality assurance representative participates in the decisions affecting defective material. It is emphasized, however, that responsibility for changing the contract cannot be delegated by the procuring agent and that acceptance of nonconforming material is a type of contract change.[2]

The determination of what methods shall be used to verify the quality of a product is within the purview of the field Defense inspector after having

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[1]Defense Supply Agency Manual 8200.1, Procurement Quality Assurance Manual for Contract Administration Services (November, 1964), Sec. IV.

[2]Ibid., p. 2, and Sec. V, Part I.

performed the mandatory functions directed by the purchasing office. He is guided by an amalgam of techniques developed by the military services. These include the ratio and skip-lot statistical sampling plans and first article procedures of the Army, the classification of defects system of the Navy, and the contractor decision verification and system element evaluation techniques of the Air Force.[1]

Policy in DSA product verification has been affected by the tendency of major military purchasers of identical items to issue separate contracts. In such situations, evaluation of the contractor's performance of contractual quality assurance requirements is conducted on the overall facility level rather than on an individual contract basis. Due cognizance is given, however, to the accomplishment of unique product requirements as specified in the contract.[2]

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[1] Ibid., Sections VI and VII.

[2] Ibid., Section I, p. 1.

CHAPTER VII

ELEMENTS OF DEPARTMENT OF DEFENSE QUALITY ASSURANCE

In the past fifteen years, industry has been endeavoring to define those elements of quality control that can be identified with the overall cost of a product. Although this effort was not initiated by J. M. Juran, his pleas for systematic control of these cost elements tended to emphasize and to popularize the need.[1] In 1946, the General Electric Company began to identify the elements associated with producing items for commercially specified minimum quality levels. In 1952, the definitions that it had developed were applied to DOD contracts.[2] By applying his experience with the General Electric effort to a broad spectrum of industry, A. V. Feigenbaum developed three categories of quality control elements: failure prevention, quality appraisal, and failure correction.[3] The next major effort to isolate quality control elements resulted from an Air Force contract study made by Stanford University. The final report delineated 367 elements that affect,

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[1] J. M. Juran, Quality Control Handbook (New York: McGraw-Hill, 1951).

[2] R. J. Pierce and R. E. Beames, "A Matter of Management-Quality Cost for Missiles and Space Products," Nineteenth Annual ASQC Technical Conference Transactions (Ann Arbor: Edwards Bros., Inc., 1965), pp. 99-108.

[3] A. V. Feigenbaum, Total Quality Control Engineering and Management (New York: McGraw-Hill, 1961).

in some degree, the overall quality of end products. These elements were grouped into two broad classifications: deliberately undertaken functions involving quality creation and appraisal and resultant functions generated by the failure of products to meet specifications either before or after delivery to the customer.[1]

Within the DOD, there does not exist a standard definition of what constitutes a procurement quality assurance element.[2] The Air Force has utilized a definition which relates the subparagraphs of MIL-Q-9858 to certain quality control functions of the contractor. These are specified as the procedures, techniques and processes which are part of the manufacturer's product quality system.[3] The DSA uses this definition also, but relates all contractor operations to their influence on product quality.[4] From this evidence in the literature, it is determined that existing quality elements pertain to an industrial quality control system and have only cursory, if any, relation to the DOD procurement quality assurance function.

The historical foundations for military procurement quality assurance policies and procedures and their treatment in the several manuals

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[1] R. A. Hemmes, W. G. Ireson, and D. E. Morgan, Quality Cost Analysis Implementation Handbook (Stanford: Department of Industrial Engineering, Stanford University, December, 1964).

[2] Not contained in any DOD directive nor in MIL-STD-109A, Military Standard Quality Assurance Terms and Definitions (October, 1961).

[3] Air Force Systems Command Manual 74-1, op. cit., Chapter III.

[4] Defense Supply Agency Manual 8200.1, op. cit.

shall be examined in the following discussion to determine what factors are considered important to all the service philosophies. These factors are defined as the DOD quality elements which, for purposes of this study, shall form the basis for further comparison. Each element so identified is discussed in each of the quality program documents considered.

All services recognize that the desired result of quality assurance programs is acceptance of material which conforms to the requirements of the contract. Thus, the first common element discernible is the examination of these requirements. When these are known, the field agent selects, plans, and implements the procedures that will ensure that these requirements are satisfactorily achieved. He establishes the second element, a quality assurance plan.

Within the plan, service representatives are guided by their respective manuals in the employment of a series of major functional activities. First among these is the discussion of methods for evaluating the initial adequacy of a contractor's quality control and inspection system. Maintenance of the desired quality level is described under various titles having the general purpose of building confidence in the contractor's procedures.

To aid the field representative in establishing the confidence level necessary to accept a product without examining every unit characteristic, the services endorse the use of statistical sampling techniques. Another aid is the selective employment of product inspection operations within the

manufacturing process. Also available are certain special tests and inspections devised on a commodity-oriented basis and special techniques for verifying product testing equipment. Additionally, when the confidence level of a contractor becomes questionable, an important factor in reestablishing that confidence is the widely recognized element of corrective action.

The services support some type of physical product verification, establish policies for the control of subcontracted supplies and specify details for handling nonconforming materials including the ensuing action to prevent recurrences. The field representative is required to maintain records suitable for reevaluation--the quality history.

The authority to reject material presented for acceptance by the manufacturers is granted to all field quality assurance representatives by their respective regulations. This is a powerful tool in the hands of a widely dispersed organization and, as such, is closely controlled by detailed procedures.

Two other quality elements may be identified and dispatched at this point. They have not been previously identified and, since the mutual acceptance of procedures for their conduct has been so complete, they have nothing to contribute to this study. These factors are (1) the preservation, packaging, and shipping of material,[1] and (2) the approval procedures governing the use of DOD acceptance stamps.[2] Formal instructions

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[1]Secretary of Defense Project 60, op. cit.

[2]Department of Defense Instruction 4155. 1, Uniform Inspection and Acceptance Stamps, Use by the Military Departments (January 25, 1956).

contained in the manuals merely repromulgate the determinations of the Joint Military Packaging Training Center for the former and the DOD directives for the latter.

To recapitulate, the DOD quality elements which shall be compared in the next chapter are listed below for convenient reference:

1. Examine contract requirements.
2. Establish a procurement quality assurance plan.
3. Evaluate the contractor's quality control system.
4. Monitor the contractor's quality control system.
5. Statistical sampling methods.
6. Inspection during production process.
7. Special tests and inspections.
8. Verification of testing equipment.
9. Corrective action requirements.
10. Product verification.
11. Control of subcontracted supplies.
12. Treatment of nonconforming material.
13. Maintenance of quality history records.
14. Rejection authority.

CHAPTER VIII

SIGNIFICANT SIMILARITIES AND DIFFERENCES IN MILITARY DEPARTMENT QUALITY ASSURANCE

Quality Element No. 1 - Examine Contract Requirements

The Army does not specify a formal review of its contracts by the field procurement quality assurance representative. Rather, the guidance document informs him of what types of requirements will exist in the contract. In carrying out his responsibilities, therefore, the implication exists that the contract must be examined for these requirements before an inspection plan may be selected and developed. He is required to ascertain that an engineering review of procurement documentation has been performed for adequacy of technical and quality requirements.[1]

The Navy's field representative is required to review the technical requirements contained in the engineering data package for adequacy. In addition, he is required to conduct a qualitative and critical examination of contractual terms and specifications to ensure their competence, his familiarity with the details, and his understanding of the requirements.[2]

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[1] AMCR 715-509, op. cit., para. 1-5-002.

[2] Office of Naval Material Instruction 5000.3, op. cit., Vol. II, Chapter VII, paras. 207220 and 207221.

The requirement for formal contract review in the Air Force exists for information purposes. Procurement quality assurance personnel are expected to be familiar with the contractual provisions relative to their function.[1] In order to acquaint them with the general provisions which typify contracts, a reference section is provided.[2]

Contracts are reviewed by DSA field organizations to determine resource requirements and special quality provisions which must be accounted for in its procurement quality assurance program. It is expected that inspection, acceptance, and shipping procedures will not differ substantially from standard contractual requirements. Technical and quality reviews of engineering documentation are not specified.[3]

Significant in this element is the amount of support provided the contracting agency by the on-site field organization. The Navy policy permits a great amount of interchange in order to achieve the most advantageous contract arrangement possible. Army policy ensures that some echelon has paid attention to the detail of the procurement. The Air Force and DSA approach to contract review is for information and presumes that the contracting agent has performed adequately in the area of quality assurance requirements. In case of conflict or confusion, all services leave the

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[1] Air Force Contract Management Division Manual 74-1, Procurement Quality Assurance Program, Chapter II, p. 3 (May, 1965).

[2] Ibid., Chapter III.

[3] Defense Supply Agency Manual 8200.1, op. cit., para. 1-103.

avenue of clarification open between field activity and the contracting officer.

Quality Element No. 2 -
Establish a Procurement Quality Assurance Plan

Army representatives are provided with six types of procurement quality assurance plans for guidance. Each type addresses a different level of contractor quality system responsibility. Instructions are detailed in each plan for contractor system evaluation, product verification, customer planning and operations, and interpretations of contractual supplier obligations. The field agent's task becomes one of selecting the proper plan, integrating the production situation with the plan, and making modifications to the plan which will account for any special technical agency directives.[1]

Unless otherwise specifically directed, the Navy inspector has total responsibility for determining the type, degree, and scope of procurement quality assurance actions necessary to ensure that product quality conforms to contract requirements. Systems evaluation may be performed in accordance with either the DOD interpretive document, Handbook H50, or the Navy check list modification thereto, Form NAVEXOs 4355/7. Broad guidelines are established for use of the various types of product inspection procedures which may be modified by the procuring agency.[2]

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[1] AMCR 715-509, op. cit., Parts I and II.

[2] Office of Naval Material Instruction 5000.3, op. cit., par. 207240.

Air Force planning is accomplished in accordance with specific policies regarding contractor system evaluation and decision verification. The former makes use of Handbook H50 as an aid in developing quality element check lists which are used to determine the degree of conformance with which the contractor adheres to his own instructions. This evaluation is conducted using the fifty observation technique. Permissive instructions are provided to the representative for use in determining when to employ mandatory physical inspection of end products.[1]

Broad policies are implemented in the planning phase of DSA procurement quality assurance operations. Contractor system evaluation is planned in accordance with DOD Handbook H50. Verification of contractor quality decisions is accomplished by the fifty observation technique. Conformance by the supplier to his own system is evaluated by establishing quality and inspection elements for the manufacturing operation. Provision is made for performing the mandatory product inspection directed by procurement activities and for determining the necessity for similar, but self-imposed, requirements.[2]

Significant in this comparison is the amount of reliance placed on the field quality assurance representative. In certain cases a Navy procuring activity directs the entire procurement quality assurance effort as may be

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[1]Air Force Contract Management Division Manual 74-1, op. cit., Chapter IV.

[2]Defense Supply Agency Manual 8200. 1, op. cit., Sec. II.

illustrated by the purchase characteristics of fleet ballistic missiles and nuclear propulsion engines. In the main, however, the Navy is almost wholly dependent upon its inspection organization to plan the complete quality effort and testify to its adequacy. More detailed guidance is available to Air Force and DSA personnel and much more detailed requirements are provided to Army inspectors. In effect, the Army expects the field installation to perform operations, the DSA and Air Force expect it to plan as directed and perform per plan, while the Navy expects it to conceive the plan and perform the planned operation.

Quality Element No. 3 -
Evaluate the Contractor's Quality Control System

Initial evaluation of a contractor's quality control system is required by all types of procurement quality assurance plans provided by the Army for field use. The procedures used in this evaluation are dependent on the type of plan specified. If the contractor is required to have a quality control system, it may be judged using the DOD Handbook H50. All other plans contain specific criteria which provide the standards for evaluation. Technical agency participation in the examination and modification of these criteria are permitted.[1]

Formal evaluation by the Navy field organization is required by some technical bureaus when major, new contracts are placed with a

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[1] AMCR 715-509, op. cit., Parts II and III.

manufacturer.[1] This supports the otherwise very general requirements that the contractor's system should be evaluated. Examinations are conducted using the applicable portions of the Navy guidelines for review, Form NAVEXOs 4355/7. Which portions are appropriate is deduced from the contract requirements for the supplier quality systems and from the evaluation factors provided by the procurement offices and other participating agencies.[2]

Prior to the development of an Air Force quality assurance plan, the field representative is required to conduct a system elements evaluation of the contractor's procedures. The bases for such evaluation are the contractual specifications as interpreted by DOD Handbook H50 and the degree of compliance exhibited by the contractor to his own established procedures.[3]

Prior to or at the start of production, DSA activities perform the initial evaluations on the basis of the manufacturer's conformance to his written quality program. Technical assistance may be requested or directed and purchasing agents may participate in such reviews as deemed necessary.[4]

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[1]Bureau of Naval Weapons Instruction 4330. 12, op. cit., para. 107131.

[2]Office of Naval Material Instruction 5000. 3, op. cit., par. 207261.

[3]Air Force Contract Management Division Manual 74-1, op. cit., Chapter IV.

[4]Defense Supply Agency Manual 8200. 1, op. cit., p. 14.

Significant in this evaluation element is the dependence of DSA on the producer's quality systems which exist at the time a contract is awarded, regardless of the type of material purchased. This approach is a large portion of the Air Force evaluation criteria but appears to be incidental to the Army and Navy reviews. The latter two departments employ a product-oriented evaluation with the Army being more precise in its criteria for the determination of adequacy than the Navy.

Quality Element No. 4 -
Monitoring the Contractor's Quality Control System

Army field organizations are enjoined to perform systems evaluation continually and concurrently with product verification inspection, using the same criteria specified for initial review efforts.[1]

Similar criteria are used for Navy activities except that certain technical bureaus require the entire review to be conducted whenever major changes in the contractor's quality system occur and at such other times as the field representative detects cause for reappraisal. The term "such other times" refers to increasing internal or external detection of product deficiencies.[2]

After the initial evaluation, Air Force policy introduces the methods of continuous audit to provide surveillance of the contractor's quality control system. These methods include establishing criteria for determining

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[1] AMCR 715-509, loc. cit.

[2] Bureau of Naval Weapons Instruction 4330. 12, loc. cit.

mandatory product control, continuing original system element evaluation as refined by quality history, and implementing contractor quality decision verification techniques.[1]

A similar situation to the Air Force exists for installations of the DSA except that the establishment of mandatory inspection criteria is not wholly determined by the cognizant representative. Purchasing offices may specify mandatory product verification and must be apprised of monitoring results before changes can be effected.[2]

Significant in the systems monitoring efforts of the several departments is the subordination of such reviews to product verification by the Navy. A similar emphasis is implied in Army documentation because of the relative amount of detail that governs product verification as compared to system evaluation. The approach of the Air Force and the DSA reflects a strengthening of system evaluation and analysis and a dependence on the results thereof to indicate the necessity for increasing the level of product verification.

Quality Element No. 5 -
Statistical Sampling Methods

Statistical sampling techniques are provided to Army field installations for use with the product verification function of all inspection plans.

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[1] Air Force Contract Management Division Manual 74-1, op. cit., Section B.

[2] Defense Supply Agency Manual 8200. 1, op. cit., Section II.

Current methods reflect DOD approved sampling plans for customer use and military specification plans appropriate to both supplier and customer. Selection of the proper statistical method is the responsibility of the quality assurance representative. Its selection should provide for maintaining confidence in the quality of the end product commensurate with the objective quality level demonstrated by the contractor. Minimum amounts of product verification are specified regardless of observable supplier competence. This minimum is defined as the statistical sample of every tenth lot of material produced.[1]

Navy inspectors select statistical methods from the same set of DOD and military specification plans. The application of these techniques to production items is entirely within the purview of the field agency as guided by very general policy. Minimum product verification effort is not modified from that contained in the statistical plans used. However, the practicality of further reductions in required effort is recognized and is subject to authorization by the technical bureaus.[2]

Very broad guidelines are provided to Air Force representatives for the selection and application of statistical sampling techniques. The practical utilization of these plans is discussed to differentiate valid from acceptable methods. Departures from the existing plans are recognized as

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[1] AMCR 715-509, op. cit., Part 3, Chapters 8-11.

[2] Office of Naval Material Instruction 5000.3, op. cit., p. 7-38i.

statistically invalid but may be employed provided that such deviations are not rejected by the procuring agency.[1] Skip-lot sampling techniques have resulted.[2]

DSA recognizes all available statistical plans and provides definite criteria to aid in selecting the appropriate methods. In addition, the DSA has approved certain skip-lot sampling plans for successively reducing the amount of product verification required. Further reduction is not authorized when inspection has been reduced to the statistical sampling of every eighth lot of material produced.[3]

Significant in this quality element is the unanimity of recognition that practical application of statistical sampling techniques is difficult under conditions of limited manpower, large production volume, and concurrent systems evaluations. Army and DSA procedures limit the amount of reduction in product verification whereas Air Force and Navy procedures could result in practically no physical inspection.

Quality Element No. 6 -
Inspection During Production Process

Army directives for the conduct of in-process inspection are based on the philosophy that product verification should be performed at the highest level of assembly consistent with the adequate assurance of quality in the

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[1] Air Force Contract Management Division Manual 74-1, op. cit., Chapter 17.

[2] Air Force Bulletin 520, Statistical Sampling Using Skip-Lot Methods, May 17, 1960.

[3] Defense Supply Agency Manual 8200.1, op. cit., Sec. VI, parts 1, 2, and 3.

item. If the quality of the end product can be validated during a final inspection, there will be no in-process effort. However, provisions exist for field representatives to ensure inspection of important characteristics at process points whenever it is impractical to verify these characteristics at end-product levels.[1]

The Navy subscribes to an identical philosophy. It prescribes, however, that the impracticability criteria be applied only to those characteristics whose validation reflects upon end-product acceptability and which become hidden or inaccessible in the completed article.[2]

Performance of in-process inspection by Air Force representatives is limited to two types of activity. One type is applied on selected characteristics or processes for determining the adequacy of contractor controls. Once this adequacy has been established, the decision verification technique replaces that effort. The other type is the performance of temporary inspection at points in production where causes of observed or potential defects are detectable. This type is also replaced by decision verification when the condition has been corrected by the contractor.[3]

The DSA recognizes the use of in-process inspection in a manner similar to the Air Force concept. However, a class of mandatory inspection activity exists which allows a procurement agency to direct inspection

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[1] AMCR 715-509, op. cit., par. 1-4-001.

[2] Office of Naval Material Instruction 5000.3, op. cit., par. 207310, b1.

[3] A.F. Contract Management Div. Manual 74-1, op. cit., Chapter 4, Section B.

effort within a production process. In this event, a quality history is generated and the purchasing office is encouraged to relax its requirements as soon as the evidence supports such action.[1]

Significant in this element of procurement quality assurance activity are the dichotomous approaches among the service departments. The Army and Navy do not allow complete withdrawal from product verification of those characteristics initially important enough to warrant in-process inspection. Although the decision verification techniques of the Air Force and the DSA may include some direct inspection of the product, the implication is that it will be very widely scattered throughout the life of the production contract.

Quality Element No. 7 -
Special Tests and Inspections

Army requirements for this quality element generally are specified in the contracts. They will include, but will not necessarily be limited to, preproduction tests to verify quality requirements, initial production tests to establish probability of future conformance with quality requirements, proof acceptance tests involving product performance requirements, and periodic comparison testing to ensure continued compliance with procurement requirements of all types. Such examinations are normally performed at sites detached from the manufacturer's facility.[2]

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[1] Defense Supply Agency Manual 8200.1, op. cit., p. 17.

[2] AMCR 715-509, op. cit., par. 1-5-006.

Similar requirements in the Navy are included in the function of the individual technical bureaus that design and incorporate them into contracts as engineering tests and inspections. There are no overall minimum requirements specified with respect to quality conformance. The Navy does require, however, that field agents coordinate special tests which establish the properties of materials and components used in the production of its articles. Such tests are physical, chemical, functional, and qualificational. They are conducted by the contractor and are corroborated by periodic, independent tests performed at government laboratories.[1]

Minimum Air Force requirements include qualification tests, preproduction examinations, and first article configuration inspections. All of these are contractually specified and are normally conducted at the contractor's facility. Field quality assurance personnel maintain cognizance over other tests and inspections called engineering evaluation and analysis, system tests, or operational tests in order to detect evidence of need for quality improvements.[2]

DSA agents are dependent on contract provisions and instructions from purchasing offices for the determination of quality assurance test activity required. Detailed guidance is provided for the frequently required validation of qualification tests and performance of first production

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[1] Office of Naval Material Instruction 5000.3, op. cit., Part F.

[2] Air Force Contract Management Division Manual 74-1, op. cit., Chapter 8.

Similar requirements in the Army are included in Army Regulation 70-1, "Research, Development, Test and Evaluation of Army Materiel," and in Army Regulations 702-3 and 702-4, "Quality Assurance Tests and Inspections." There are no overall Department requirements currently with respect to quality assurance. The Navy does require, however, that field agents coordinate special tests, where necessary, for properties or materials and components even in the procurement of its utilities. Such tests are periodic, electrical, functional, and environmental. They are conducted by the contractor and are corroborated by independent tests performed at government laboratories.[1]

Although the Force Requirements Manual provides some tests, preproduction assessments, and some actual configuration inspections, all of these are contractually specified and are normally conducted at the contractor's facility. Field quality assurance personnel conduct some other tests and inspections either requiring evaluation on facility, utilities tests, or operational tests in order to avoid subsequent quality requirements.[2]

Bid agents are responsible for contractual specifications and instructions from providing advice for the establishment of quality assurance for material received. Detailed guidance is provided for the inspection, inspection, validation of qualification tests, and performance of data assessments.

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[1] Office of Naval Material Instruction [illegible], op. cit., Item 2.

[2] See Force Commander Instruction Manual [illegible], op. cit., Section 8.

article inspections.[1]

Significant in this area is the lack of minimum requirements in the Navy and the subsequent dependence on its field activities for adequate procedures which are applicable within the contractual scope of the work. This characteristic of Navy procurement relates to the Navy's position in Quality Element No. 2, the planning effort. The Army and Air Force have systematized its requirements into product-oriented contract specifications. The difference between the latter two services' approach is the degree of involvement allowed the supplier during such tests. The DSA position is unique in that its role is reactive rather than creative.

Quality Element No. 8 -
Verification of Testing Equipment

Army field representatives are provided detailed procedures for use whenever a calibration system for test equipment is required by the procurement documents.[2] The verification consists of ensuring the adequacy of procedures used by the contractor in maintaining the accuracy of the equipment. This includes the standards used and the sources thereof, environmental controls, calibration intervals and identification, detailed calibration procedures, and control of sub-supplier calibration. The local quality assurance representative is supported in this effort by the test equipment verification laboratories and metrology specialists available

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[1]Defense Supply Agency Manual 8200. 1, op. cit., Sec. VII.

[2]Specification MIL-C-45662, Calibration System Requirements (March 18, 1960).

within each technical command.[1]

Instructions to Navy organizations are very general and appear as sub-elements to those quality elements which are discussed in more detail. The Bureau of Ships and Weapons is credited with initiative in the area of test equipment accuracy evaluation and calibration policies. Its directives range from procurement to operational use of delicate electronic and weapons systems.[2] Inclusion of contract requirements for adequate calibration systems and the use of the DOD interpretive handbook are current techniques which aid field agencies in verifying test equipment.[3]

Air Force instructions are very detailed. DOD Handbook H52 is clarified for specific commodity application by its field agents.[4]

Quality assurance representatives of the DSA are also instructed to verify test equipment in accordance with the DOD Handbook H52. Metrology specialists, approved commercial laboratories, and government laboratories are available to aid in the accomplishment of this function.[5]

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[1]AMCR 715-509, op. cit., Part II, Chapter 7.

[2]Bureau of Naval Weapons Instruction 4355.5A, BuWeps Calibration Program, Establishment of (September 22, 1961); and Bureau of Naval Ships Instruction 4355.17, Quality Control System for Complex Supplies and Equipment (May 22, 1961); and BuWeps Standards Laboratory Information Manual (prepared by U.S. Navy Metrology Engineering Center, Pomona, California).

[3]Department of Defense Handbook H-52, Evaluation of a Contractor's Calibration System (July 7, 1964).

[4]Air Force Contract Management Division Manual 74-1, op. cit., Chapter 14.

[5]Defense Supply Agency Manual 8200.1, op. cit., Sec. X, part 1.

Significant to this element is the uniformity of approach to an extremely complex and highly specialized endeavor wherein the ability to measure is frequently overtaken by the performance of military material.

Quality Element No. 9 -
Corrective Action Requirements

Corrective action requirements at the Army field level are based on the expectation that contractors will take prompt action to correct the cause of manufactured products failing to meet contract specifications. This policy extends to supplier action designed to prevent such occurrences. When prompt action is not taken, field personnel are responsible for notifying the procuring activity that will determine the appropriate contractual sanction.[1]

The Navy does not separate corrective action from the normal functions of procurement quality assurance. The requirement to effect corrective action is directed to the contractor on each observation of system deficiency or product defectiveness. Such notification may be oral or written, depending on the criticality and frequency of the deficiency. Determination of the adequacy of such corrective action is the responsibility of the representative. No specific guidance is provided since the contractor is expected to react favorably to knowledge of defects.[2]

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[1] AMCR 715-509, op. cit., pp. 2-1-202, 2-2-202, and 2-4-202.

[2] Office of Naval Material Instruction 5000.2, op. cit., pars. 207302, 207642, and 207643.

Conditions in this element if the inspectors of engineers are to be extremely conscious and highly knowledgeable about the ability to measure it frequently according to the maintenance manual.

Quality Element No. 2
Corrective Action Requirements

Corrective action requirements as the Army field level are based on the assumption that a contractor will take prompt action to correct the cause of nonconforming products rather than to merely quarantine the product. This policy encourages a supplier action designed to prevent such occurrences. When critical action is not taken, DCMC personnel are responsible for insuring the preventing activity that will determine the appropriate corrective action.[1]

The Army does not separate corrective action from the normal functions of performance quality assurance. The requirement is where corrective action is already in the contractor's or sub contractor's delivery of product deficiencies. Most publications can be used as supplies, depending on the criticality and frequency of the deficiency. Determination of the adequacy of such corrective action is the responsibility of the cognizant. The inspector is required to exert everyone to complete as always.[2]

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[1] Army 715-507, op. cit., pp. 5-1-100, 5-1-200, and 5-1-300.

[2] Office of Naval Material Instruction 4855.2, op. cit., pp. 2-1, 2-2, 2-3, and 2-4.

Air Force corrective action procedures are described in four levels of severity. The requirement for corrective action may be satisfied on the spot. In more complex situations, a written deficiency report may be required. Should the contractor fail to take adequate corrective action, a formal letter may be used and, if this is not effective, recommendations to the procuring agency are made for appropriate contractual sanctions including notification of the cessation of product acceptance. Adequacy of corrective action is determined by temporary product verification at the production point affected or by the progress of corrective action projects in the case of complex conditions.[1]

The DSA policy for corrective action is an exact duplicate of the Air Force concept.[2]

Significant in this element is the delegation of contracting officer authority and responsibility to the field level of the Navy. Timeliness is the key factor in the Navy's determination of adequate corrective action and differentiates its policy from the other military agencies.

Quality Element No. 10 - Product Verification

The product verification policy for Army field representatives is highly detailed. Its performance introduces the necessity for classifying

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[1]Air Force Contract Management Division Manual 74-1, op. cit., pp. 4-16 to 4-18.

[2]Defense Supply Agency Manual 8200.1, op. cit., Sec. II, part 5.

the characteristics inspected according to their ultimate effect on the product. Characteristics classified as critical are inspected by means of a rigid sampling technique which prohibits sampling until 920 consecutive units have been successfully produced. The policy reinstates 100 per cent screening upon detection of a single defective item. Other attributes are acceptable upon validation by statistical methods. Product verification is expected to be performed independently of the supplier but allowance is made for witnessing tests provided that the inspector is personally capable of performing the test and an independent examination is not feasible.[1]

Navy performance of product verification utilizes the classification of defects concept. Critical potential defects are inspected by a sampling plan which does not allow reduction of inspection below the statistical confidence limit that 99.7 per cent of the attributes were acceptable. Other attributes are sampled in accordance with standard plans[2] and modified techniques which have not been rejected by the technical bureaus.[3]

Continuous product verification not subject to replacement by decision verification is discussed in Air Force instructions. Generally, this type of mandatory product control is confined to confirming end product functions.[4] The characteristics subject to such inspection are treated by

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[1]AMCR 715-509, op. cit., Part 2.

[2]Specification MIL-STD-105D, op. cit., revised August, 1962.

[3]Office of Naval Material Instruction 5000.3, op. cit., p. 78i.

[4]Air Force Contract Management Division Manual, op. cit., App. D.

sampling methods except that critical classifications of characteristics are screened 100 per cent.[1] The classification of characteristic approach, although designed for engineering use, is endorsed for guidance of the quality assurance representative in determining his initial efforts prior to acquiring a quality history.[2] In addition, the policy formalizes a mandatory visual, safety-type final product inspection.[3]

The DSA recognizes the characteristic classification technique but does not segregate the product verification sampling plans to be used for specific classifications. The standard statistical plans are applied to all mandatory inspections required by purchasing offices unless otherwise specified.[4]

Significant in the comparison of this element is the extent of product verification directed by policy making offices within each department. With the exception of DSA, all departments specify severe requirements for the verification of characteristics critical to the function of their product. In other situations, the Army specifies how much shall be done and when, the Navy reserves the right to perform any amount of product verification, and the Air Force minimizes the magnitude of direct inspection necessary for acceptance.

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[1] Ibid., p. 17-3. [2] Ibid., Chapter 18.

[3] Ibid., Chapter 4, Section C.

[4] Defense Supply Agency Manual 8200.1, op. cit., p. 17.

weighing minutes against the final product classification of characteristics are determined jointly per case.[1] The standardization of characteristics [illegible] although desired for reclamation use, is [illegible] by assurance requirements to determine the total acceptance [illegible] assuring a quality history.[2] In addition, the [illegible] is a [illegible] any visual, [illegible] and [illegible] inspection.[3]

The [illegible] the [illegible] but does not [illegible] the [illegible] are specific [illegible]. The [illegible] all [illegible] inspections required by providing [illegible] [illegible].[4]

Significant in the [illegible] is the [illegible] and [illegible] directed by policy [illegible] for the acquisition of [illegible], and [illegible] for the [illegible] of [illegible] [illegible]. In other [illegible], the [illegible] [illegible], the Navy reserves the right to perform any [illegible] [illegible], and the Air Force [illegible] the [illegible] necessary for [illegible].

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[1] [illegible], p. 17-1.

[2] [illegible], Chapter 11.

[3] [illegible], Chapter 9, Section C.

[4] [illegible] Supply Chemical Manual 4400.1, [illegible], p. 17.

Quality Element No. 11
Control of Subcontracted Supplies

Uppermost in the Army consideration of this element is the contractual requirement that the prime supplier is responsible for controlling the quality of material purchased from a subcontractor. A separate and detailed inspection plan is provided to field representatives for determining the adequacy of a contractor's performance in this area. The major requirement in determining when to evaluate performance at a subcontractor's facility is whether such action is essential in adjudging end product acceptability. The choice of product verification or sub-supplier system evaluation is determined by a secondary set of factors which include: the economics of material and labor; subcontractor special or proprietary processes; availability of special tools and instruments; and the adequacy of test and inspection reports which purport to represent the article. The inspection plan anticipates that another Army field agency is cognizant of the sub-supplier. In addition, the field agency reviews subcontracts issued by the prime contractor to ensure that necessary quality requirements are included.[1]

The Navy recognizes prime contractor responsibility to control his suppliers. Evaluation of the need for source inspection is based on the functional criticality of the article supplied, prime contractor requirements for ensuring the quality of these functions, and the best interest of the

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[1] AMCR 715-509, op. cit., Part II, Chapter 6.

Quality Element No. 11
Control of Subcontracted Supplies

Operations in the Army constitution of this element is an contractual requirement that the prime supplier is responsible for controlling the quality of material purchased from a subcontractor. A separate [illegible] detailed inspection plan is provided as well verification for determining the adequacy of a contractor's performance in this area. The major [illegible] need to understanding when to evaluate performance at a subcontractor's facility is whether such action is essential to adjudicating [illegible] acceptability. The course of product verification or sub-supplier system evaluation is determined by a secondary set of factors which include: the economics of material lost time, subcontractor special or proprietary processes, availability of special tools and laboratories, and the adequacy of last the inspection reports which purport to represent the article. The inspection plan indicates that another Army field agency is responsible of the sub-supplier. In addition, the field agency reviews subcontracts issued by the prime contractor to ensure that necessary quality requirements are included.[1]

The Army requires prime contractor responsibility in dealing for supplies. Elimination of the need for source inspection is based on the functional suitability of the article supplied, prime contractor requirements for ensuring the quality of these functions, and the best interest of the

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[1] Alice Tinsley, op. cit., Part 2, Chapter 2.

government. Interest of the government is determined by considering the availability and adequacy of test and inspection reports concerning the functions, the necessity for verifying those reports, the availability of special tools and test equipment, and whether the article is shipped direct to a DOD using activity. Subcontract review is used by Navy field activities in a manner similar to the Army. The Navy approach to sub-supplier product verification or system evaluation does not anticipate Navy personnel at the subcontractor level.[1]

Contractor responsibility for this element is endorsed by the Air Force. The basic criteria for inspection at a subcontractor's plant are the complexity of the article and the criticality of application, together with the inability of the prime contractor to ascertain the quality characteristics at his own facility. Such characteristics are verified by 100 per cent screening. The criteria of direct shipment to DOD using activities are recognized also. System element evaluation techniques are used on other subcontracts in accordance with a detailed list of prime contractor practices which demonstrate a sound approach to control of these purchases. Periodic and unscheduled sub-supplier inspections may be combined with system evaluation to determine subcontractor capability and prime contractor effectiveness. Temporary source inspection may be undertaken in the case of failure to correct deficiencies.[2]

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[1] Office of Naval Material Instruction 5000.3, op. cit., pp. 7-6, 7-7.

[2] Air Force Contract Management Division Manual 74-1, op. cit., Chapter 9.

DSA policies are reflections of the provisions of ASPR, Section XIV. Procurement quality assurance action at the subcontractor level is performed when shipments are made direct to DOD using activities or when the purchasing office specifies government inspections which cannot be accomplished by prime contractors. DSA field offices having cognizance of prime contracts may utilize selected evaluations at sub-supplier levels to verify the maintenance of contractor control over these supplies. Additionally, the factors which demonstrate a sound approach to such controls are included in the quality element evaluations.[1]

Significant in the comparison of this element is the broad, interpretive judgment required of Navy field activities in determining what is in the best interest of the government. Army judgments are based on more detailed criteria. Operations are strictly defined and controlled. Air Force and DSA philosophy is restrictive and designed to minimize direct sub-supplier actions.

Quality Element No. 12 -
Treatment of Nonconforming Material

The Army procurement quality assurance program does not discuss this element. The authority to disposition nonconforming material is vested in the technical commands. As indicated in Chapter III, this responsibility is often delegated to an on-site representative, but the exercise of the

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[1]Defense Supply Agency Manual 8200.1, op. cit., Section IV.

authority is limited to judgments of defective characteristics which have minor effect on the product. The existence of pre-established defect classifications is important to this delegation since the field agency is not granted the authority to classify. The establishment of nonconforming material review boards at contractor plants depends on the availability of on-site technical command representation. When established, however, these boards have authority to disposition nonconforming supplies having major or critical effects on the article.[1]

Navy policy allows the disposition of minor discrepancies to be performed at the inspector level. This authority may be withdrawn, however, by the cognizant technical bureau by virtue of its authority to control material review board operations.[2] Boards may be established by technical bureaus with local quality assurance representation but their authority remains restricted to minor deviations. Technical bureaus also determine the amount of classification authority which may be delegated to the field representative when formal classification of defects is absent.[3]

Broad authority is granted to the Air Force inspector for disposition of material containing variances.[4] Variances are defined in a manner

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[1] AMCR 715-509, op. cit.

[2] Office of Naval Material Instruction 5000. 3, op. cit., par. 207645.

[3] Bureau of Naval Weapons Instruction 4355. 12, Air Force and BuAer, Navy Department Policy for Material Review (February, 1960).

[4] Air Force Contract Management Division Manual 74-1, op. cit., Chapter 10.

similar to the minor classification of the Army and Navy. Most variance disposition decisions are made by the contractor subject to audit by field personnel. Material review board action demanding customer concurrence is reserved for those cases wherein a precedent does not exist. The Air Force philosophy is that the most important action to be taken by the board is prompt and effective corrective measures which will prevent recurrence of the variance. Other types of discrepancies are referred to the procuring agency.[1]

Authority to disposition nonconforming material is not granted by DSA. It may be granted by the purchasing office to a Contract Administration Office for exercise in accordance with DSA material classes I and II. Class I corresponds to major and critical characteristics and is normally retained by the purchasing offices. Class II applies to all other material and functional defects. When the authority is granted, the role of the field representative is advisory to the CAS office. Material review boards may be established by this office whereupon the local inspector is delegated the disposition authority.[2]

Significant to this element is the recognition by all services of the need to classify the effects of nonconforming characteristics. The names of these classifications differ but the controls placed upon acceptance of the

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[1]Air Force Specification Bulletin No. 515, Control of Nonconforming Supplies (November 3, 1959).

[2]Defense Supply Agency Manual 8200.1, op. cit., Sec. V, Part I.

discrepancies which affect performance, durability, reliability, and interchangeability are substantially the same. Air Force policy reflects a higher degree of reliance upon its suppliers.

Quality Element No. 13 -
Maintenance of Quality History Records

Quality history records exist for two purposes: as an aid to the field agencies in detecting trends in their own and the contractor's quality effort and as a means of communicating procurement quality assurance results to external organizations. This quality element is of sufficient magnitude to include in this study. The last major tabulation of quality history records produced for external distribution is contained in the Secretary of Defense Project 60, Sub-Task Force I, report dated March, 1963. No effort has been made to corroborate the results.

Significant in that report was the existence of 145 such records and forms. Only two were used by all four service organizations and nine were used by more than one organization. The remaining 134 records were unique to individual services.

Quality Element No. 14 -
Rejection Authority and Discontinuance of Inspection

Army rejection authority is vested in the use of mathematically sound statistical sampling plans. The exercise of the authority depends on product verification results. Upper limits for such inspection activity are not specified except in the case of critical characteristics where 100 per cent

screening is directed. Contracting officers may authorize discontinuance of inspection of critical characteristics. This action must be recommended by the field quality assurance representative, supported by excessive defects and a failure by the supplier to take action to correct the conditions that allowed the defect to occur. There is no rejection authority associated with contractor quality systems evaluation. Requests for corrective action is the method specified for improving discrepant systems and preventing the recurrence of defective products. Corrective action is not rejectable but can be judged ineffective by the results of continuing high levels of product verification. When contractor quality control system requirements are included in the contract, a procedure exists for discontinuing product inspection for serious system deficiencies without prior approval by the contracting officer. Seriousness is described as that which is likely to result in the supplier, directly or indirectly, concluding that nonconforming material is conforming.[1]

The authority to reject material in the Navy procurement quality assurance organization is based on department and DOD approved sampling plans and the objective evidence of defective articles detected by product verification procedures. Field activities are not guided as to the maximum inspection expected nor are there instructions for the employment of inspection discontinuance as an element of this authority. This condition is modified if the statistical procedures of DOD Handbook H109 are selected for use.

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[1]AMCR 715-509, op. cit., Part 3, Chapter 7; Part 2, Chapter 2, Sec. IV.

This procedure provides for the routine discontinuance of inspection after a specified maximum product verification effort has determined the supplier's inspection system to be defective.[1] Contractor quality control system deficiencies are not subject to rejection. However, an identical system of corrective action procedures exists for material and system defects. The degree to which this system is appropriate is broadly defined and, therefore, leaves the extent of application to the judgment of the field representative. Recourse to the procuring agency is restricted to the provisions of the ASPR wherein the procurement quality assurance segment can recommend that the contractor show cause for not terminating the contract for default.[2]

Rejection authority relates to the amount and type of product verification employed by Air Force on-site representatives. In addition to material defects observed, deficiencies resulting from contractor decision verification and system element evaluation may be subjected to a specific sequence of corrective action steps. The first of these is oral, on-the-spot corrective action. This may be followed by written notification to the contractor, initially by discrepancy report format, then by formal letter, if warranted. Should these measures be ineffective, the Air Force

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[1]Department of Defense Handbook H109, op. cit.

[2]Office of Naval Material Instruction 5000. 3, op. cit., pars. 607642 and 607643.

agent may request the contracting officer to authorize discontinuance of product acceptance.[1]

An exactly identical procedure to that of the Air Force is employed by DSA field agents. Different nomenclature is used for the levels of corrective action requested of contractors.[2]

Significant in the comparison of this element is the degree of responsibility placed upon Navy procurement quality assurance activities. Rejection authority in all services must be substantiated by product verification results. No articles can be rejected on the basis of system evaluation even though all agencies, except the Navy, recognize inspection discontinuance as a method of obtaining quality system improvements.

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[1] Air Force Contract Management Division Manual 74-1, op. cit., Chapter 4, Sec. B.

[2] Defense Supply Agency Manual 5200. 1, op. cit., Sec. II, Part 5.

CHAPTER IX

SECRETARY OF DEFENSE PROJECT 60

QUALITY ASSURANCE RESULTS

The sub-task group of Project 60 which studied the procurement quality assurance function of contract management summarized its effort as follows:

> Review . . . indicates that the over-all quality assurance contract management mission is essentially the same. The chief differences are the manner of implementation, terminology, geographical boundaries . . . and metrology program.[1]

Accordingly, most of the conclusions and recommendations offered were oriented toward improving organization, coordination, education, and personnel administration. Technical recommendations for inclusion in a unified Quality Assurance Manual were not as extensive as anticipated. Difficulties with terminology and wide variations in the treatment of quality elements by existing instructions prevented more detailed analysis. The need for further intensive study was recognized and recommended.[2]

Some technical evaluations and recommendations of the sub-group are pertinent to this paper. Metrology implications of complex, high dollar

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[1] Secretary of Defense Project 60, op. cit., p. 3.

[2] Ibid., p. 233.

CHAPTER IX

SECRETARY OF DEFENSE PROJECT 1: QUALITY ASSURANCE RESULTS

The underlying premise in Project 1 was that quality assurance quality assurance function in industrial management necessary to achieve its success.

> Further . . . industries with the overall quality assurance management philosophy is essentially the same. The chief differences are the nature of technologies, terminology, procedures, documentation . . . and monitoring programs.[1]

Accordingly, most of the conclusions and recommendations offered were primarily based involving organization, centralization, automation, and personnel administration. Technical recommendations are included in a unique Quality Assurance Manual were not as extensive as anticipated. Difficulties with technology and were validated in the treatment of quality elements by existing instructions provided more detailed analysis. The need for further research clearly into technical and management.[2]

Some technical resources and recommendations in the sub-areas are provided in this paper. Definitely implementation of complex, high cost

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[1]Secretary of Defense Project 1, op. cit., p. 2.

[2]Ibid., p. 211.

value, low-volume procurements led to the conclusion that individual service activity should be continued and consolidated DOD effort accelerated. Simultaneously, more reliance on contractor metrology programs was recommended after providing for appropriate contractual responsibility.[1] The improvements which have resulted from this conclusion are reflected in Chapter VIII under Quality Element No. 8.

The study also concluded that source inspection on low dollar value, non-critical or commercially available components was unjustifiable. This use of procurement quality assurance resources was not considered commensurate with existing instructions and diluted the effort which should be expended on contracts critical to major programs.[2]

The detailed examination of contract requirements was evaluated most effective when conducted at the lowest possible level of operations. This lowest level was described, however, as a function of the complexity, uniqueness, and frequency of the procurements.[3]

Specific recommendations were made which affect the evaluation of a contractor's quality control system. Development of detailed DOD evaluation documents for all levels of effort required of contractors was strongly advised. Mandatory evaluations were recommended prior to any material acceptances when a contractor was performing his first government contract, manufacturing an article for the first time, or resuming

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[1] Ibid., p. 194.

[2] Ibid., p. 192.

[3] Ibid., p. 240.

Also, the volume correspondence lag in the conversion and materials service activity should be monitored and standardized QCM audit materials. Simultaneously, more reliance on contractor quality programs was recommended after considering the improved contractor training.[1] The correspondence audit data excluded from QCM conditions are published in Chapter VIII (Quality Control) Exhibit No. 4.

The study also concluded that engine deliveries to the Air Force contractual or commercially acceptable condition were satisfactory. The use of strict contract quality clauses resulted in a considerable commitment with existing instructions and effort for effort should be expended on contracts critical to major programs.[2]

The Quality Verification Program (QVP) was evaluated. Most activities were concerned at the lowest possible level of operation. The level had not functioned. However, as a function of the contractor, customer, and frequency of the procurement.[3]

Specific recommendations were made about both the evaluation of a contractor's quality control system. Development of checklists and evaluation procedures for all levels of QVP implied a consistent and strongly revised. Mandatory criteria were recommended prior to any material inspection from a contractor and introducing the first article test conform, concentrating on items for the first time, or requiring

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[1] Ibid., p. 117.

[2] Ibid., p. 120.

[3] Ibid., p. 121.

major production after a 120-day interruption. The feasibility of establishing monitoring criteria and systematic reevaluations was deferred to future interservice coordination.[1]

The sub-group concluded that initiation of on-site procurement quality assurance plans should be undertaken by the procuring activity. Such planning instructions were envisioned as containing all necessary descriptions of what shall be inspected and when, where, and how it shall be inspected. The local representative would remain responsible for the detailed planning which would be subject to disapproval by the procuring activity. General quality assurance plans, similar to the Army quality system category plans, were recommended for future interservice negotiation.[2]

Product verification was viewed by the sub-group as tending toward deemphasis. The reversal of this trend was considered necessary although its accomplishment was not viewed optimistically without a centralized procurement quality assurance organization.[3]

Minimization of quality history records externally distributed was recommended for early consideration. In this case, also, it was advised that effective results were dependent upon the existence of a strong central agency.[4]

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[1] Ibid., pp. 241-242.

[2] Ibid., p. 243.

[3] Ibid.

[4] Ibid., pp. 250-251.

The sub-group recommended that nonconforming material review board authority to accept minor discrepancies be delegated to field representatives without reservation. Procuring activities should retain the right to disposition other nonconformances and the prerogative of delegating its authority to specific individuals of requisite qualifications. Standards for material review board operations were deferred to interservice coordination.[1]

The major recommendation to prepare a standard Procurement Quality Assurance Manual contained the caution that this document would be subject to two serious limitations. The manual should be compatible with existing service instructions and would require sufficient flexibility to incorporate the mandatory inspection instructions issued by contracting agencies.[2]

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[1] Ibid., p. 261. [2] Ibid., p. 253.

The sub-group recommended that administrative material prior sent [illegible] to assure minor discrepancies be delayed in full expectations without prejudice. Preserving activities seems really [illegible] right to disposition more consultancement [illegible] the properties of delegating its authority to specific individuals [illegible] requisite qualifications. Standards for material review [illegible] [illegible] were deferred in [illegible] coordination.[1]

The entire [illegible] is primary a measure [illegible] Quality Assurance Manual contains the [illegible] that this document would be [illegible] in two actual limitations. The manual should be compatible with existing service instructions and would require [illegible] to incorporate the mandatory inspection instructions issued in [illegible] agencies.[2]

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[1] Ibid., p. 44.

[2] Ibid., p. 171.

CHAPTER X

TOWARD UNIFIED PROCUREMENT QUALITY ASSURANCE

On April 14, 1954, the DOD promulgated the following basic quality assurance policy statements:

> 1. Responsibility rests upon the contractors and producing activities for controlling product quality and for offering to the Military Departments for acceptance only those items or lots of items considered by them to conform to contractual requirements; and
>
> 2. Responsibility rests upon the Military Departments for determining that contractual requirements have been complied with prior to the acceptance of the product.[1]

Underlying the development of this concept of contractor responsibility was the realization that, however intensive, customer inspection cannot provide adequate protection against receipt of inferior material. This is particularly true in the case of highly complex articles whose acceptability can be evaluated conclusively only by performing tests to destruction. The amount of customer inspection, therefore, becomes a function of the ability of the supplier to prevent production of defective material and of the evidence with which he supports that ability.[2]

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[1] Department of Defense Instruction 4355.6, Department of Defense Quality Assurance Concept and Policy (April 14, 1954); since cancelled and reissued on June 15, 1964, to include DSA.

[2] Riordan, "Protecting the Consumer Against Inferior Quality," op. cit., p. 41.

CHAPTER X

TOWARD INDEPENDENT PRODUCT QUALITY CONTROL

On April 11, 1962, the DOD promulgated the following Inter-Service Procurement Quality Policy statement:

> 1. Responsibility rests upon the contractors and prime activities for controlling product quality and for adhering to the Military Specifications for acceptance only those items or lots which conform to them in conformance to mandatory requirements; and
>
> 2. Responsibility rests upon the Military Departments for determining that contractual requirements have been complied with prior to the acceptance of the product.[1]

Underlying the development of this concept of contractor responsibility was the realization that, however laudable, contractor assessment cannot provide adequate protection against receipt of defective material. This is particularly true in the case of highly complex products where acceptability can be evaluated conclusively only by performance tests or inspection. The concept of contractor inspection therefore, becomes a function of the ability of the supplier to prevent processing of defective material and of the evidence with which he supports that ability.[2]

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[1] Department of Defense Instruction 4155.2, Implementation of Product Quality Assurance Concept and Policy (April 16, 1962), page enclosed in memorandum dated June 12, 1962, to Contractors.

[2] Harrison, "Preparing for Contractor Assigned Inspection Quality," op. cit., p. 41.

All military departments have published endorsements of the first policy statement. The organizations which were charged with achieving the second policy statement approached their common responsibility in a manner sufficiently different to be burdensome to both industry and each other. The committee on Appendix Q, therefore, was chartered to formulate a widely applicable procedure for use by all field levels of procurement quality assurance.[1] This charter was supported by the philosophy then developing in the offices of the Director for Quality and Reliability Assurance, Office of the Assistant Secretary of Defense for Installations and Logistics (OASD, I & L). This philosophy sought to serve the best interests of DOD and industry by performing the procurement quality assurance function with a minimum of different organizations. The viability of such an organization was believed dependent on strong centralized management direction and clear organizational identity. The concept also considered the effectiveness of the procurement quality assurance program to be contingent on the authority to render objective, independent judgments of product integrity.[2]

Each military department and the DSA brought to the coordinating committee meetings their peculiar set of policies and procedures. These, together with the techniques and methods which emerged in each agency to

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[1]Interview with George Brown, U.S. Navy Alternate Representative to the ASPR XIV Review and Coordinating Committee, February 9, 1967.

[2]John J. Riordan, "DOD Quality and Reliability Assurance Administration and Organization," DOD Cost Reduction Journal, Winter 1966-67, III, No. 1, pp. 39-40.

support the DOD concept represented years of internal coordination and development. This was true of the recently established DSA, also, inasmuch as its quality management team was selected from the personnel who had participated in the departmental evolution of quality assurance programs. Each approach had served adequately to perform the responsibility of accepting material in conformance with contractual requirements. Each service approached the coordinating task confident that the others would recognize the value of its procedures for performing the unified procurement quality assurance function.[1]

The initial consolidation efforts were directed toward the amounts of product verification performed by each agency. The Army inspected more of the product than the Navy, which in turn inspected more than the Air Force or DSA. The Army specified in its contracts what procurement quality assurance would be performed; the Navy reserved the right to perform any type and quantity; while the Air Force documented its intention to perform as little as the contractor's results would allow. DSA tended to perform as directed by procurement agencies and to emphasize supplier quality results in order to proportionately minimize that direction. As committee action progressed, the Army and Navy agreed on the degree of assurance atainable from direct inspection effort and the Air Force and

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[1] Interview with S. G. Hamner, U.S. Navy Representative to ASPR XIV Review and Coordinating Committee, January 26, 1967. Corroborated by R. C. Tyner, U.S. Army Representative and initial Chairman of the Committee, on January 27, 1967.

DSA agreed on the degree attainable from indirect inspection and system evaluation.[1]

In December, 1965, the first preliminary draft of Appendix Q was published. It was a detailed procedural manual which discussed, in depth, all the quality elements identified in Chapter VII. These procedures reflected the adaptation of methods previously employed by one or more of the agencies on an element-by-element basis. This composite differed from the initial expectation of the members to modify an existing service program.

The composition of the manual showed that the Navy viewpoint prevailed in establishing the organization level at which the procurement data package requirements were reviewed for contractual and technical adequacy. Navy techniques for verifying special processes and its definition of when to employ inspection during a production process were included. The Army system of providing detailed quality assurance plans for each level of contractor quality responsibility was adapted. The manual also supported the Army's preproduction and proof testing techniques. Traditional Army and Navy product verification policies and statistical sampling methods were incorporated. Absolute minimum product verification levels were adopted from Army procedures. Step techniques in achieving corrective action reflected the prevalance of the Air Force concept of this quality element.

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[1]Interview with S. G. Hamner, January 26, 1967.

This method was modified, however, to include the Army's policy of discontinuing inspection and acceptance concurrent with referral to the procuring agency rather than awaiting authorization. Air Force techniques in verifying contractor control of purchased supplies and its procedures for monitoring a contractor's quality control system using element checklists appeared in the manual. The basic policy for treatment of nonconforming material by the Air Force was modified to restrict the reliance placed on suppliers and to incorporate Army documentary practices for referring significant deficiencies to procuring agencies. Other quality elements were used as existent when significant agreement was evident, as in test equipment calibration and verification, or were separately negotiated when the diversity was extreme, as in quality history records.

Significant by their absence in the preliminary draft were the following concepts:

1. Contractor decision verification
2. Fifty observation methods.
3. Mandatory product control classifications.
4. Mandatory inspection classifications.

Significant because of its presence is the following quotation from the proposed Appendix Q:

> Purpose. The purpose of this Supplement is to provide operating procedures for Government representatives assigned to plants of Department of Defense (DOD) suppliers. Where necessary, operating procedures pertaining to procurement quality assurance efforts above the supplier's plant level are also included.

Application. The Military Departments or the Defense Contract Administration Services (DCAS) shall not issue alternative procedures to this Supplement. DOD handbooks and manuals which concern matters related to quality assurance (e. g., DOD handbooks H-50, H-51, H-52) shall be used as appropriate to complement and supplement the procedures specified herein. Departmental publications covering the same subject matter as this Supplement shall not be used. The forms and instructions to be used for the actions and procedures herein shall be those provided in this Supplement. Other forms and instructions serving the identical intent and purpose are not authorized.

The preliminary draft of Appendix Q was reviewed by industry and interested DOD agencies. The comments were editorial and nonsubstantive. Accordingly, after minor changes, a second preliminary draft was submitted to OASD (I & L) on March 1, 1966. At this time, the Air Force reserved the right to submit a minority opinion. This dissenting endorsement of the manual affected the ensuing change in the chairmanship of the committee from the Army to a member of the Quality and Reliability Assurance Directorate of OASD (I & L). The committee continued its negotiations which, proving unprofitable, culminated in the November, 1966, request that the Air Force submit its own draft of Appendix Q.[1]

The third preliminary draft by the Air Force added contractor decision verification techniques and mandatory product control procedures. The most significant difference, however, was the proposed exception of military resident procurement offices from mandatory use of Appendix Q. In the Air Force, thirty of these offices verified and accepted material

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[1] Interview with George Brown, February 9, 1967.

representing 85 per cent of the purchasing dollar.[1] These residencies, in addition to fifty-eight Navy and thirteen Army offices, had been exempted fromthe DCAS reorganization of contract management functions.[2] The reason given for the proposed exemption was that supplementary instructions would still be necessary for each product verified by the resident organizations and that the March, 1966, Appendix Q did not recognize departures necessitated by production peculiarities or uniqueness of the purchased material.[3]

In contrast to the Air Force, the Army and Navy considered the third preliminary draft to be deficient inasmuch as minimum product verification limits were not specified. At about the same time that the Air Force submitted its December, 1966, version of Appendix Q, the DSA released a preliminary revision of its procurement quality assurance manual which also did not specify a lower limit for direct inspection procedures.[4] This document, not yet officially published, represents a departure from previous DSA policy.[5]

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[1]Interview with R. P. Hussey, Air Force Representative to the ASPR XIV Review and Coordinating Committee, January 25, 1967.

[2]Department of Defense Instruction 4105.59H, DOD Directory of Contract Management Services Components (April, 1966).

[3]Interview with Hussey, op. cit.

[4]Interview with Hamner, op. cit.

[5]Defense Supply Agency Manual 8200.1, op. cit., Sec. VI, Parts 2 and 3.

representing 34 per cent of the procurement dollar.[1] There was necessary, in addition to the regular Army and Military Air Force, but been recommend [illegible] DCAS reorganization of contract management [illegible].[2] The [illegible] was given for the proposed reorganization was that DCAS supply-[illegible] would still be necessary for each product [illegible] the minimum [illegible] then and that the March, 1962, Appendix D did not [illegible] [illegible] by producing production [illegible] [illegible] [illegible].[3]

In contrast to the Air Force, the Army was fairly successful in [illegible] relationship about it be delegated [illegible] [illegible] [illegible] [illegible] [illegible]. At about the same time the Air Force submitted its Decision, 1962, version of Appendix D, the DOD released a preliminary revision of its procurement quality assurance manual which also sought a lower level for direct interaction [illegible] [illegible].[4] This document, not yet officially published, represents a [illegible] [illegible] [illegible].[5]

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[1]Interview with [illegible], Air Force Representative to the AMPA XIV Review and Coordinating Committee, January 23, 1962.

[2]Department of Commerce Industrial [illegible], DCAS Directorate, Contract Management Division Conference [illegible], 1962.

[3]Interview with [illegible], op. cit.

[4]Interview with [illegible], op. cit.

[5]Defense Supply Agency Manual 8200.1, op. cit., [illegible] [illegible] [illegible].

Also during 1966, the DSA was developing a procurement quality assurance philosophy of X, Y, and Z segments. Segment X was being designed as a form of contract which would commit the procuring services to the policies DSA had established for the quality assurance of its assigned contracts. Interservice coordination was to precede the promulgation of this segment and would identify the DSA procurement quality assurance program but would not contain procedural matters. Segment Y would contain the procedures by which the field representative would implement the understandings reached in the X segment. This segment would not be coordinated. Segment Z would exist for information and would not be binding on any procurement agency or field representative. Its purpose would be to identify the differences in commodities, associated industrial techniques and production state of the art. This effort was undertaken in the belief that knowledge of uniqueness would tend to improve the procurement contracts and their administration.[1]

On January 17, 1967, the Director of Quality and Reliability Assurance for OASD (I & L), Mr. John J. Riordan, notified the chairman of the committee to commence a paragraph-by-paragraph review of ASPR XIV and Appendix Q. The object of this review was to report the necessity for additional DOD directives which would ensure implementation of the regulatory

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[1]Interview with Donald T. Vining, Head, Quality Plans and Policy, Defense Supply Agency, Cameron Station, Virginia, February 9, 1967.

policies to be agreed upon. It was intended that DOD policy statements amplify Appendix Q and, if peculiarities did exist, that these not be discussed in the ASPR.[1]

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[1]Memorandum from J. J. Riordan to C. J. Brzezinski, dated January 17, 1967.

CHAPTER XI

CONCLUSIONS AND OBSERVATIONS

There is an extraordinary degree of similarity in the departmental approaches to most of the quality elements. The differences which do exist are discernible in Chapter VIII. From that evidence it is concluded that there are only two principal differences among the procurement quality assurance philosophies. These are:

1. The amount of physical product verification considered necessary in order to discharge the departmental responsibility assigned by DOD.

2. The degree to which product peculiarities and unique production environments necessitate the use of procedures, methods, and techniques tailored specifically for the material whose quality is being validated.

The effect of these differences on achieving a uniform quality manual is discussed in Chapter X. Upon the events thus described is based the conclusion that an unforeseeable depth of conviction existed in support of each divergent approach to product verification and quality assurance planning for individual procurement articles.

The foregoing analysis supports the hypothesis of this paper. In addition, there appear to be several observations which indicate challenging

CHAPTER XI

CONCLUSIONS AND OBSERVATIONS

There is an extraordinary degree of variability in the experimental approaches to work on the quality element. The statement which follows are given hypothetic in Chapter VIII. From this evidence it is concluded that there are only two principal deterrents among the professional quality advocates statements. These are:

1. The amount of physical product utilization a manufacturer must be willing to devote to developing its governmental performability analyses by DCAS.

2. The degree to which a person specialized and unique technical environment permeates the use of procedures, methods, and facilities tailored specifically for the research which quality is being addressed.

The extent of this deterrence in achieving a balance among manual is discussed in Chapter X. Given the period that prevailed is based the qualitative that an individual's earnings in economic terms relative to support of each directed expenses in product verification and quality assurance although for individual professional activities.

The principle factors concerning the hypothesis of this paper. In addition, there appear to be [illegible] observations which indicate [illegible]

areas for future study. The first of these is the cause for the strength of opinions regarding how much product verification is sufficient. The author believes that there are several causes:

1. Unrealistic, uneconomical, and inefficient specifications for quality in production and at user levels. This situation arises from:

2. The inability to measure the value to the final user of the quality assurance effort conducted by contractors or by government personnel. Current value is intuitively determined and effectiveness is expressed only in relative terms. This deficiency, in turn, affects:

3. The failure to achieve a precise mathematical or functional relationship between the amount of DOD procurement quality assurance effort, the reliability, integrity, and demonstrated performance of DOD suppliers, and military effectiveness of material in operational performance environments.

The resulting inference is that multi-agency agreement concerning procurement quality assurance systems should not be expected below the policy-making level. The complexity, magnitude, and multiplicity of variables which affect each defense procurement are not conducive to centralized management of procedures and methodology. Product-oriented knowledge of design, production engineering, fabrication techniques, and end-user capability provides the basis for enlightened reorientation of procurement quality assurance elements. Such an approach may yield the mix of procedures, techniques, and methods which will best discharge the assigned

area for future study. The first of these is the cause for the strength of opinions regarding how much product improvement is realistic. The author believes two issues are crucial points:

1. Controllable, measurable, and institutional improvements in performance are at hand levels. This situation will first lead

2. The inability to measure the value in the final user or the quality assurance point resulting in overstatement or by government personnel. Contract value is inherently structured and effectively is supervised only in relative terms. This ambiguity, in turn, adding

3. The failure to achieve a strong contractual or institutional relationship between the amount of DOD procurement quality assurance effort, the reliability, integrity, and demonstrated performance of DOD suppliers, and military effectiveness of material in operational performance environments.

The prevailing tolerance in this multi-agency government/contractor assessment quality assurance system should not be expected below the policy-making level. The management, engineering, and availability of weapon-bearer work direct and indirect functional are not responsive to overtailed management of procedures and methodology. Product-related knowledge of design, production engineering, inspection techniques, and non-destructive capacity exists only in the additional verification of production quality assurance channels. Such as exported only yield the use of procedures, methodologies, and systems which will not guarantee the fulfilled

responsibility and satisfy the final user's requirements simultaneously.

It is suggested that inter-service agreement may be reached if standard procurement quality assurance plans are developed on a commodity basis and if such plans provide for the selection of techniques and methods by knowledgeable local field representatives. There is sufficient similarity among the departments in procurement quality assurance of aircraft, missiles, ammunition, communication, and detection equipment, to name only a few, to warrant the attempt.

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